# MODERN PLASTICS

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## Of General Interest



## Technical Section



## News and Features



Cover color this month PERSIAN RUBY (Created by Textile Color Card Association)

## Next Month

Saving space, a perplexing item in "overhead" expense, is a project worthy of executive interest in all major industry and commerce. Newspapers, magazines, libraries, insurance companies, government offices and many industrial organizations are saving space by preserving their records through microfilm photography. So we have enlisted the services of Recordak Corporation, a subsidiary of Eastman Kodak Company and pioneers in microfilm and microfile, to tell our readers about it in the March number.

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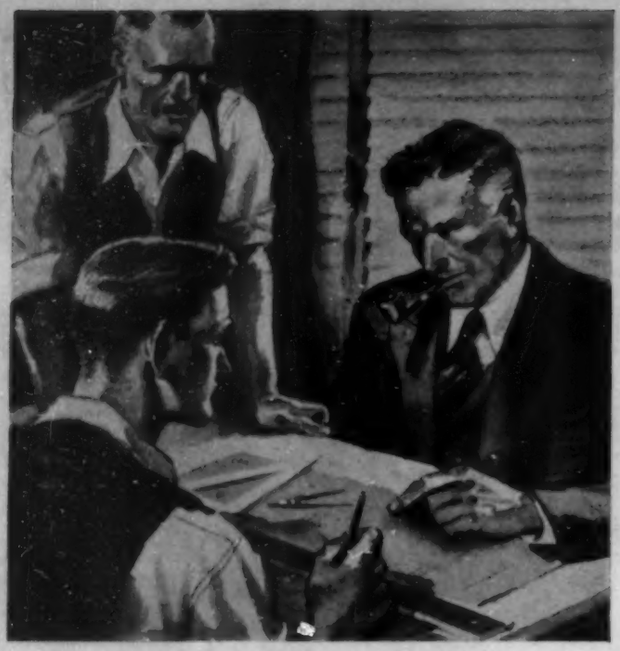

*We always get the TOUGH JOBS*


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MODERN PLASTICS
FEBRUARY 1938 VOLUME 15 NUMBER 6

# LET'S LOOK AT RADIO CABINETS

by W. H. MacHALE*

"A NEW PLASTIC RADIO CABINET!—WHY there is no news in that. A new one appears almost daily in the retail stores and is easily spotted by the public." Such were the words of an editor who was assembling data, recently, for a story on new developments in the use of urea and phenolic molding compounds for various applications.

No news!—probably, except that his remarks merely emphasized the widespread and universal acceptance of these materials, and complimented them on their success in this major market. It is quite true that over the past eighteen months the number of designs appearing on the market has increased until it is now well over thirty. Cabinets in black, chinese red, ivory and brown, in varied forms and sizes have so thrust themselves upon the eyes of the consumer that they could not but be familiar to him. The appearance of these new sets, and the force with which they strike the eye has probably multiplied their impressionistic number a hundredfold. There is no news here—except that success or major achievement might be so considered.

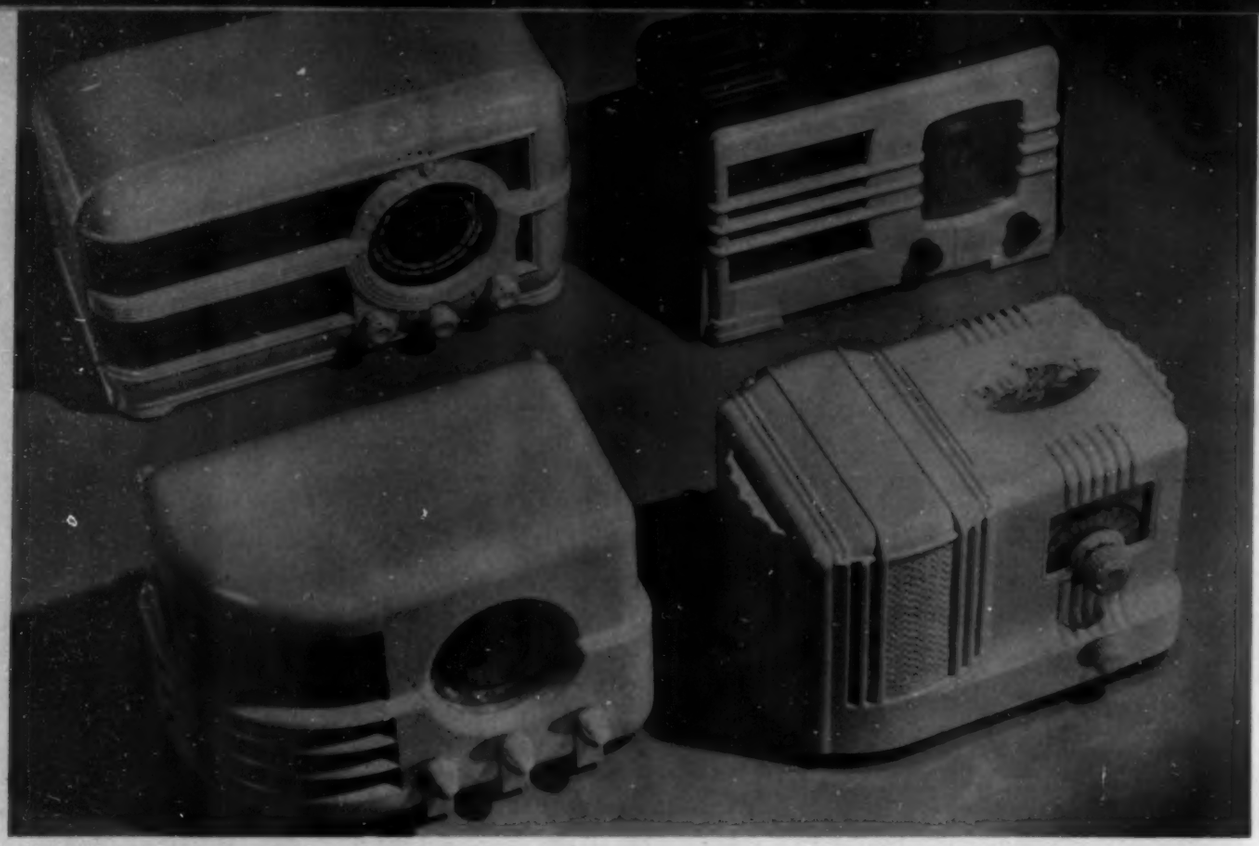
Why have these plastic housings won such rapid and widespread popularity? Is the consumer aware of the basic causes for such a general use of these plastics or is he even aware of his private reasons for preferring them? To him, very probably, the words "phenolic" or "urea" moldings mean very little. He may visualize test tubes, beakers, cauldrons, and a little black magic producing a product which—when tossed into some machinery—automatically forms into his radio cabinet, complete, and in a design very much to his liking. He is remarkably near the truth in this analysis and comes very close to the actual reasons for this application of plastic materials.

Radio manufacturers today, particularly those producing small sets, are operating in a highly competitive market. Quality of reception and performance, together with price, have been pretty well standardized so that competition is resolving about design and appearance. Natural materials, such as wood and metal are limited somewhat in their adaptability to new ideas. Cabinet making, wood finishing, painting, and lacquering, although ancient and honorable arts are apt to be expensive, thereby affording further limits to the designs available, on the basis of costs. Isn't it logical, therefore, that a synthetic product—which when placed in the "machinery" (more accurately, the mold) and comes out as a completed cabinet, with color, finish, and shape—is the answer to this competitive problem? Through the use of phenolic or urea molding compounds indestructible finish and color are obtained; intricate designs which would be costly in wood or metal are now molded with considerable ease and in such detail that luxury goods are now easily obtained at commonplace prices.

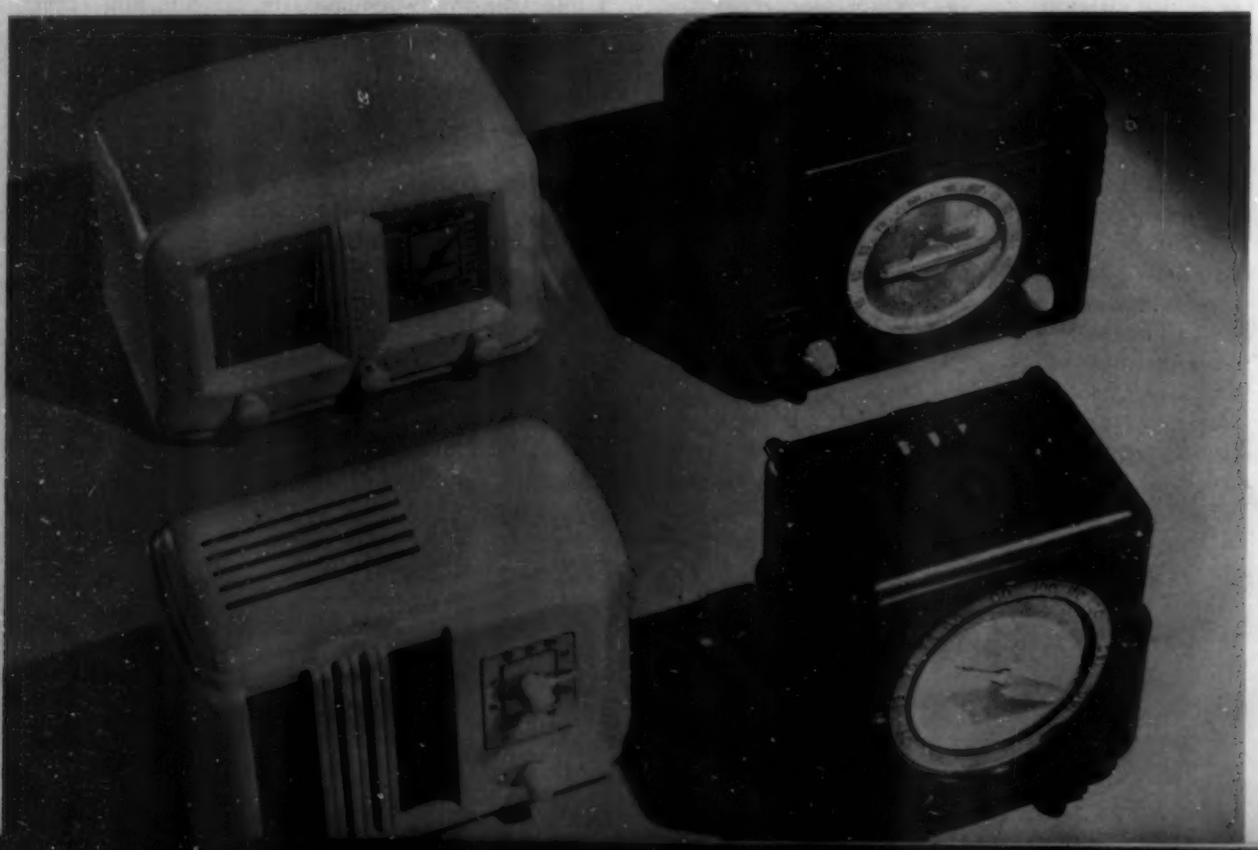
The radio manufacturer is a progressive individual in his merchandising of style. He readily sees the advantages that color and novel design afford his set in the retail outlet. Selective recognition is obtained in a very crowded market, a benefit shared by the manufacturer, retailer, and consumer.

There are other reasons for the manufacturers' use of these phenolic or urea plastics which, though they may

* Beetle Products Division, American Cyanamid Co.



Top photo—sitting, left to right—Majestic Radio model 55, with cabinet of Beetle designed by Barnes & Reinecke; Sparks-Withington Sparton Polo Club Radio designed by Fred Conley—both molded by Chicago Molded Products Corp. Standing—Pilot with Beetle cabinet designed by Jan Streng and Emerson set of Beetle and Bakelite designed by Stephen Chew—both molded by Associated Attleboro Mfrs. Inc. Below, standing, left to right—Westinghouse set molded by Northern Industrial Chemical Co. and designed by Jan Streng; General Electric cabinet of black Textolite with red bezel and knobs designed by Ray Patten collaborating with Howard Ketcham and Johnson & Zaisser. Sitting, left to right—Dunlop case molded of Plaskon and designed by Sundberg & Ferar; Majestic model 51 molded of Bakelite by Chicago Molded Products Corp. and designed by Barnes & Reinecke. On the opposite page left to right is the Montgomery Ward radio molded of Beetle by Richardson Co. Pilot radio molded of Bakelite by Associated Attleboro Mfrs. Inc. and designed by Jan Streng



not be in apparent evidence to the consumer, are valuable in affording him a better product at lower cost.

The manufacturer of radios who uses molded cabinets can standardize to a great degree, his assembly line and his packaging department. He is assured that each and every part coming from the mold will have the same dimensions, the same finish, and will react under service conditions in much the same way.

The manufacturer—through the use of plastics—is able to achieve not only an artistic design which is in keeping with market trends, but is able to merchandise color to meet the color requirements of locality, season, or style cycle. If he is aggressive, we believe greater use will be made of this weapon in the future.

The form of the cabinet need not exist for style purposes alone, but can, in these materials, become highly functional. If the case is molded in one piece, the dial, speaker grille, mounting points, and design are all one; the manufacturer "gives it the works" and out it goes.

molded into sections. By this means, frequent alterations of either the front panel, the grille, or other parts of the cabinet may be made without the necessity of building a complete new die. The Emerson three-piece cabinets and the Clinton four-piece case illustrate this technique. Through this method, not only are style alterations more economical, but combinations of colors may be used to enhance appearance.

It has been argued that, although plastic housings do offer color, finish and form as a unit, they do not withstand abuse. We believe that over-enthusiasm on the part of the designer and manufacturer may be partially to blame for this statement. To the designer, these phenolic and urea molding materials have been a fertile field for thought. There was little in the way of original design which he could not explore. A new material for new expressions, but with one limitation which sometimes he has not considered! Since these products are molded under heat and pressure into the

It has been argued that the original mold costs for such parts tend to retard quick style alterations to meet changing conditions. The high initial investment does discourage change and unless the designer is progressive, or unless a large number of pieces are needed immediately, the mold amortization cost per cabinet is apt to be prohibitive. However, if a large number of identically shaped pieces is required, the small mold charge per item is minor and in the long run will serve as a very minor cost of production. We have yet to hear of a case wherein style changes have caused the abandonment of a mold before its economic value had been fully exploited.

Within any one design there are many ways of altering the overall effect through the use of color or metal trim. Lately, a new means of combating the risks of style change has received recognition. Instead of molding the housings into one complete piece, it may be

forms required, the designer should be somewhat familiar with the reaction of these plastics in the molding operation. If he realizes that while under heat and pressure the materials become plastic, flow and finally set, he will recognize that his design *must* permit this process in an orderly manner. During the flow of the material in the mold, it is curing and stiffening. If his design fails to permit a steady even flow throughout the mold or prohibits an even application of heat and pressure on all parts, weak sections will result. The pocketing or trapping of materials in acute angles, at ribs, or in thick sections surrounded by thin partitions will lead to a weak piece. Continuous and regular flow of a stiffening material in a balanced unit should result in the production of sturdy durable cabinets.

In this connection we strongly advise close collaboration between the designer and the molder. The latter knows from past experience how (*Please turn to page 66*)

# TABLE AND SETTING
## by McClelland Barclay

THE DINING ALCOVE IN THE APARTMENT OF McClelland Barclay, renowned sculptor and illustrator, bears the unmistakable touch of an artist's hand. Every detail of design in furniture and decoration has been planned to make the most of the limited space available until one doesn't notice the smallness of the room but is impressed rather by its completeness and charm.

Opening directly off a spacious studio workroom which overlooks Central Park from the south, the alcove is partitioned off by a two-faced curtain. This is Batik on the studio side with figures that form an allegorical record of things Mr. Barclay especially likes such as oceans, ships, animals of all sorts, athletic symbols, tilting contests, etc. The silver colored cloth on the other side becomes the fourth wall of the alcove, the other walls being covered with silver Chinese teabox paper. The only wall decoration is an old Mexican plaque in black and white.

A silver painted Venetian blind screens the one window at the far side of the room. Framing the window and hanging from a silver bar with a big scallop shell at each end, are unbalanced draperies of black and white Batik in a large figured pattern. The same type of drapes are placed at the door leading into the kitchen.

On the floor is a dark silver gray rug bordered with black linoleum which has a silver stripe near the edge.

Lighting is supplied by candles and indirectly from a fixture in one corner. The inverted lighting bowl, made of aluminum but with the appearance of silver, is topped by a cluster of grapes in natural and turquoise blue glass with silver-like leaves extending above the grapes. The light filters through the grapes giving them a soft, luminous quality.

In complete harmony with this background of black, white and silver are the chairs, table and serving buffet designed by Mr. Barclay and custom made to his order. The chairs are upholstered in white cowhide above black painted legs. The extension type table has a smooth laminated black phenolic top, supported by simple white painted standards at each end. A wide strip of the same plastic material across the bottom of each standard keeps it from becoming scratched or chipped by restless feet. The table top is so constructed that two sections, one at either end, pull out from beneath making it about twice its ordinary length and providing seating capacity for ten or a dozen people. Sometimes, when in use, a lace cloth covers the table top, but more often loosely woven service mats are preferred, which contrast strikingly with the shining black surface of the table.

The serving buffet at the end of the room is also built with a laminated black phenolic top which reflects light and shadow from the candles, in holders of Mr. Barclay's design, placed at each side of a silver dish. The base, painted white and adorned with a simple glass decoration, supplies ample space for storing linens. Above the buffet is a huge mirror which gives an illusion of added length and spaciousness to the room.

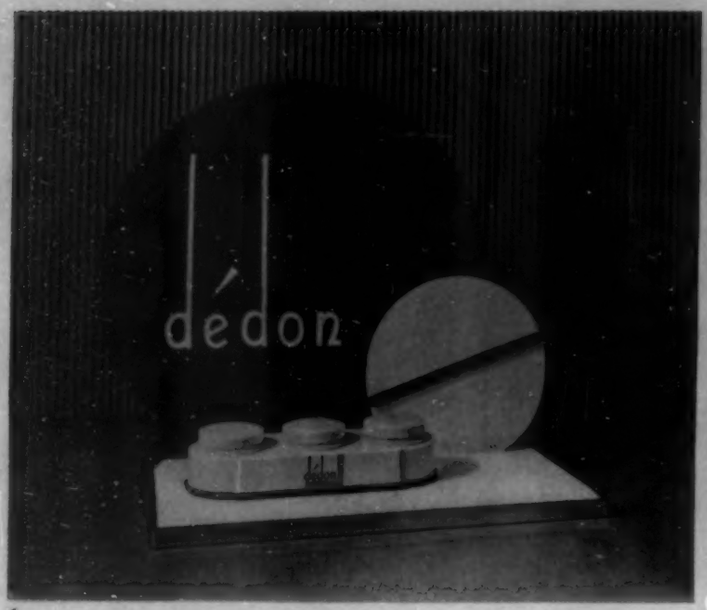
The table and serving buffet represent Mr. Barclay's first experience with plastics in furniture design. His own appreciation of the beauty of the pieces is heightened by the admiration expressed by everybody who sees them in the setting he has created.

"I like the quality and feel of the plastic," he says. "It is rarely that you find a material so completely practical and at the same time so decidedly decorative."

However, Mr. Barclay's interest in plastics extends beyond his home, and he is at the present time experimenting with the materials both for original sculpture and for molded parts to be used as decoration on the well-known Barclay line of art products.

McCLELLAND BARCLAY AT WORK

Two views of the Dining Room in McClelland Barclay's New York apartment showing the Refractory Table and Buffet with Formica tops. When closed, the table occupies but little space; opened, it seats ten

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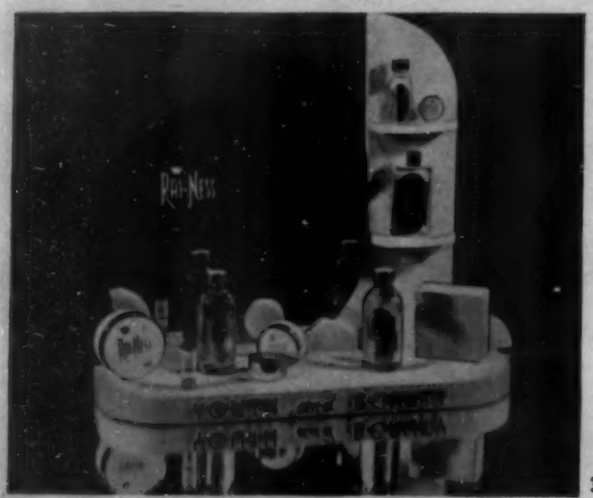
# DISPLAYS THAT SURVIVE

by DR. E. S. HARRISON*

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"POINT OF SALE" DISPLAY IS CONSIDERED THE focal point of all advertising by important analysts of merchandising plans today. Many national distributors of merchandise spend a small fortune each year to awaken consumers' interest in their products through newspapers, magazines, radio and other forms of mass advertising, but frequently devote too little thought and too little money to the display which advertises their products where it meets the public eye at the "point of sale."

Plastics have come into use in many and various ways within the past few years, but the use of plastic alone and plastic combined with wood or other materials in building displays is comparatively new to the trade. Many packages are partly or completely made of plastic resin, therefore if the display or background used to exhibit this package were made entirely or partly of this same material, would it not naturally make an effective and powerful appeal to the consumer? The attractiveness and adaptability of such a display made entirely of plastic to show a plastic package is illustrated by Fig. 1. This manufacturer wanted an all plastic display comparable in color and design to his package containing cosmetics. His package was molded of white plastic with blue base and letters. In order to "tie up" the display with the package, a large circle of deep blue with a small white circle banded in blue was used. The base was white with chrome metal molding, and the letters on the blue circle were cut out in white. *(Please turn to page 70)*

* Royson Plasticraft Company

# RELATIONSHIP BETWEEN MOLD COSTS AND PIECE PRICES

by D. A. DEARLE

THE QUESTION OF CORRECT MOLD CAPACITY continues to occupy the minds of many of those either directly or indirectly associated with the plastics industry, and its solution is apparently still a matter of conjecture. Inasmuch as the selection of correct mold sizes from a production standpoint is an important prerequisite to building the dies, it might be advisable to give this phase some concentrated thought. Steel molds for producing plastic parts have always been expensive, but today this element of cost is even greater than before, therefore, extreme care must be exercised in the purchase of molds. Each new item has a specific purpose to fulfill and the production required is usually either known or anticipated. The amount of production to be expected from a die, while very important, is not necessarily the governing factor in deciding the number of cavities to be included in the mold. The capacity is determined to a large extent by the maximum monthly requirements, but another element must also be given due consideration.

Most buyers have now become well acquainted with the fact that smaller molds cost less and that by investing less money in steel higher piece prices almost automatically become effective. They know, too, that conversely, a large mold costs more but that they enjoy a much lower price for the goods produced from it. The average buyer of plastic parts also has a fair knowledge of the methods used in figuring the number of cavities necessary to produce a given number of pieces, but aside from the production capacity angle the finer points of ultimate saving have been given only little thought.

At the outset of negotiations the vendee seeks two prices from the custom molder, namely, piece prices and mold costs. As a rule the prices sought are based on certain quantity lots, or perhaps in other instances, the mold capacities are submitted as a definite part of the inquiry. As a result, the inquiring concern receives figures based on his specifications and sometimes, suggestions for different die set-ups are offered, if the molder feels that such are more advantageous to his customer. At any rate, numerous figures are submitted on both the molds and parts and finally, the buyer makes his decision according to his own judgment. This is usually based on price, the reputation of the company and production requirements. Once he has decided on a mold large enough to fulfill his average needs, however, he often wonders whether it would perhaps be advisable to increase the size of the mold in order to obtain even better piece prices. In so thinking, he is entirely justified, but the question then arises as to just where the point of diminishing returns lies. There must be a limit to mold costs going up and part prices coming down. The two lines must meet somewhere and if this intersection could be found, the lowest possible price would then be determined. This is very true, but many more factors enter into its solution than merely piece price and mold cost. Rate of depreciation and longevity of the die will have to be ascertained or at least assumed and the fact that the money invested in more expensive dies could be invested elsewhere to earn interest will also enter into the calculations. With these thoughts in mind and remembering that production requirements must not lag too far behind expected production from a large multiple cavity die let us investigate a fictitious case.

Mr. Jones of the Dee Manufacturing Company is seeking prices on a molded part of which he expects to use about four or five hundred thousand pieces a year. As he explains it in his letter, "the first year's requirements might be quite small, but after the item has once become established on the market it will probably run into the millions." In addition, he (*Please turn to page 68*)

| Number of Cavities | Cost of Mold | Quoted Piece Price per Thousand | Estimated Annual Production | Number of Months to Produce One Million | Mold Cost Invested at 5% per Annum | Cost for One Million Pieces | Actual Piece Price per Thousand |
|---|---|---|---|---|---|---|---|
| 1 | $ 200.00 | $50.00 | 150,000 | 80 | $ 66.67 | $50,266.67 | $50.27 |
| 2 | 375.00 | 40.00 | 200,000 | 60 | 93.75 | 40,468.75 | 40.47 |
| 5 | 900.00 | 36.00 | 375,000 | 32 | 120.15 | 37,020.15 | 37.02 |
| 10 | 1700.00 | 34.00 | 600,000 | 20 | 141.95 | 35,841.95 | 35.84 |
| 20 | 3200.00 | 33.00 | 1,000,000 | 12 | 160.00 | 36,360.00 | 36.36 |
| 30 | 5000.00 | 31.50 | 1,125,000 | 11 | 229.17 | 36,729.17 | 36.73 |
| 40 | 6000.00 | 31.00 | 1,600,000 | 8 | 187.50 | 37,187.50 | 37.19 |
| 50 | 7200.00 | 30.00 | 1,667,500 | 7 | 215.28 | 37,415.28 | 37.42 |

# HEADING SOUTH

by EVE MAIN

DE PINNA 2

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**WINTER TRIPPERS, WHO LEAN** toward the languid relaxation of southern sunshine and balmy breezes, find it hard to resist the tempting displays of useful as well as ornamental doodads and smart summery outfits with which department stores and specialty shops insidiously foster the yen for meridional climes. To mention a few: (1) Cellulose blinders, held in place by white rope cord tied around the head, protect the eyes from sunswept areas of dazzling sand and water. With mere slits to peek through and streamline wings on either side, these cover the eyes completely. (2) A tailored white frock with high round neck and slightly broadened shoulders, has large, leaping plastic fish buttons in vivid hues to match the crushed side-tie belt and the trimming on a white leather bag, white leather high crown hat and white gloves. (Costume photograph courtesy Du Pont.) (3) Bracelet, earrings, belt buckle, clip and pin are hand-carved from milk-white cast resin and hand-painted with a bright red poinsettia motif. (4) Colorful pins, clips and buckles vie with the brilliance of tropical foliage. Typical scenes and figures etched and carved from cast resin are hand-painted with gay splashes of color. (Jewelry from Ortho Plastics.)

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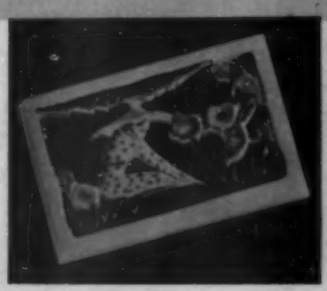

# THELMA E. BEAMAN, MOLDER

UP IN THE NORTHWEST CORNER OF THIS COUNtry, Portland, Oregon, to be more exact, is the Beaman Molded Products Company owned and operated by a woman, Mrs. Thelma E. Beaman, who admits that her greatest handicap in this business has been to convince customers and prospective customers that a woman can know how to read blueprints, how to design dies and understand the mechanical devices and technical processes of plastic molding.

"Almost invariably," she says, "when I greet a customer, he will ask to talk to the manager and when I tell him I *am* the manager he asks, "Isn't there a man here to whom I can talk, I have a difficult proposition to work out which requires engineering understanding and technical experience."

This means that she must prove all her statements and convince prospects that her suggestions offered regarding the part to be produced are based on real knowledge of plastic molding which is not always easy to do. "If I were a man," she says, "anything I said would be accepted without shadow of doubt."

The men who work in the shop are asked many curious questions by their friends and by customers who have occasion to visit the plant.

"How can you stand working for a woman?" they ask. "Does she really know anything about molding?"

And yet since 1934, Mrs. Beaman has successfully managed this molding concern, increased its business year after year and has the loyal, wholehearted support of every man who works with her. They hold her in high esteem and treat her with utmost respect because although she is a woman she asks them to do nothing in the plant which she cannot do herself.

When she was attending college in the East and later, business college in Boston, she had little realization tha. she would ever be interested in machinery; but after business college she married Mr. Beaman and lived in a small village 250 miles north of Quebec on the St. Lawrence River where he was engaged in the lumber industry.

In the Fall of 1920 they came to the Pacific coast where again they were interested in the lumber business but in a different phase. Mr. Beaman followed the architectural line while Mrs. Beaman worked with him taking off mill work lists from blueprints and estimating costs.

In 1928 when the building industry began to ebb, Mr. and Mrs. Beaman became interested in plastic molding. In the Spring of 1933, because of his ill health, Mrs. Beaman was left at the plant alone much of the time. For nearly a year she spent most of the time in the molding department working closely with the men, sharing their difficulties and providing remedies through the trial and error method. She learned what caused large and small blisters, cracks, orange peel surfaces and other aggravating conditions on the molded pieces. Then in February, 1934, she found herself alone with the business.

There were decisions to make, estimates to give out, molding to supervise, a business to be managed and financed. General business (*Please turn to page 70*)

# SAVES LEATHER—SAVES TIME

THE TRANSPARENCY AND TOUGHNESS OF CERtain plastics encourage their use in promoting industrial efficiency not possible without them. For years shoe manufacturers have used metal and fiber patterns to guide them in cutting leather parts to be used in the making of shoes. These patterns, being opaque, prevented rapid and efficient cutting because cutters must constantly lift or move the pattern to avoid imperfections and inconsistant grains in the leather being worked.

Leather, being a product of Nature, has these imperfections in the form of scars, holes, grain breaks and pit marks and the more costly the leather, the greater the loss where parts are unavoidably found to have been cut where these imperfections were not avoided in the cutting. Matching grains, for different parts of the shoe, is a difficult procedure when opaque patterns are used because there is no possibility of seeing and "balancing" the grains while they are being cut. Skins being expensive, must be cut with a minimum of waste. This means that patterns which are in themselves of irregular shape must be turned and fitted to remaining parts of the skin after the first or second cuts have been made.

Recognizing these conditions and striving to improve them, J. J. Albrecht & Son, have perfected a new type of shoe pattern called Da-Lite, in which the opaque fibre has been replaced with transparent cellulose acetate. The guiding edge is bound with metal to prevent inadvertently cutting the pattern.

Through the use of these patterns shoe cutting is greatly simplified with a resulting saving in time and leather impossible to measure. Imperfections are easily avoided because the cutter can see through his pattern without lifting it and can move it about to bring his pattern so close to the imperfection or break that no leather is wasted. Grains may be seen through the pattern and can be perfectly matched when required.

With these transparent patterns it is quite simple to place them so that close cuts can be made and imperfections so arranged beneath the pattern that they will be concealed when the shoe is made up. Fitting and lasting margins are indicated on the patterns by engraved lines filled in with color and show sizes are printed on.

Although cellulose acetate is flexible it is not as easily damaged as fiber which increases the life of the pattern sufficiently to compensate for its additional cost.

Shoe manufacturers no doubt will be quick to recognize the advantages of this improved equipment and pattern makers throughout the country can make these patterns available to their clients through a license arrangement with Albrecht & Son.

# DUSSELDORF EXPOSITION

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THOSE WHO VISITED THE DUSSELDORF INDUSTRIAL Exposition in Germany last year were impressed with the success achieved by the chemical industry in the creation of new products. Mipolam, for example, a new polyvinyl chloride plastic has replaced more conventional materials for piping and plumbing. Being resistant to acid and alkalies to a reasonable degree it is used to transfer chemicals in chemical and rayon plants and to carry formalin, alcohol, brine, beer, etc., in breweries. This plastic is extruded in hollow tubes of various sizes, may be rigid or flexible as desired, and is readily welded together at the joints by heat. Flamenol, a similar material is made in this country by General Electric Co., and used largely as insulation.

Each industry took advantage of this international display to graphically portray its important developments. Metals, for example (Fig. 1), related their progress from raw materials to airplane motors, while the story of wood (Fig. 2) was told from its beginning as fiber to finished products of every description. This was illustrated by a photomural showing steps of manufacture from forest to airplane. Coal (Fig. 3) was similarly treated, illustrating the processes of extracting synthetic rubber and plastics. The mural tells the uses of coal with cross-sections of a miniature model machine used in extracting its many products.

The chemicals and plastics industries of the United States are soon to be given an even greater opportunity to display such educational exhibits at the New York World's Fair in 1939. A building (pictured in our December 1937 issue) has been planned and will soon be built.

4. Broken bottles are fed into a machine where they are made into thread which is spun on this loom before wondering eyes into 100% pure glass textile. 5. This revolving globe of Plexiglas is used to show location of factories of a soap powder manufacturer. 6-7, are general views of the Hall of Plastics at the Dusseldorf Exposition

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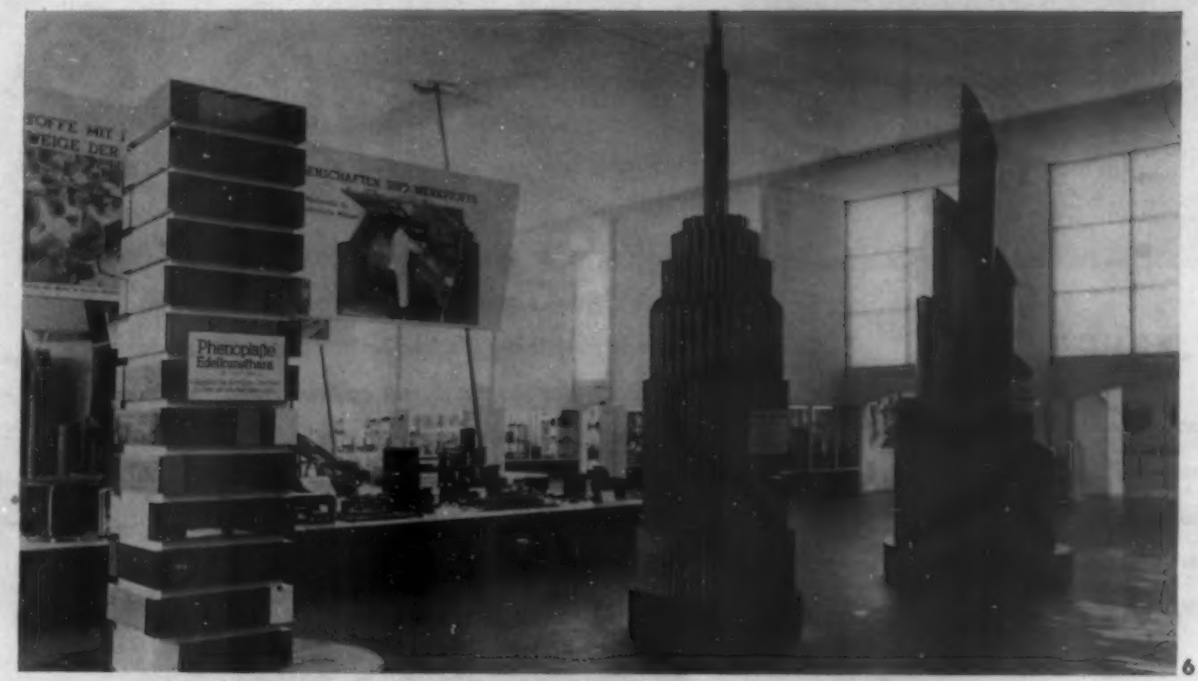


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# PLASKON

MOLDED COLOR

## TIFFANY-TONE:

Plaskon Radio Cabinets are just as popular on the West Coast as in the East, as shown by the two sets on these pages. The one above is manufactured by Herbert H. Horn Company, Los Angeles, and is a long-and-short-wave model called the Tiffany-Tone.

Ivory, one of the most popular Plaskon colors for radios, is used on scores of molded table sets. It adds to the appeal of any cabinet design, and its soft, warm tone harmonizes with any interior color scheme—whether it be modern or traditional. And Plaskon—in any color—never yellows, never darkens with age.

Other popular Plaskon colors widely used on radio cabinets, include grays, greens, blues, and tomato red. Harry W. Hahn Mfg. Co. is the molder of the Horn Cabinet.

## CLEANSER PREMIUM:

Household cleanser cans are rarely beautiful, almost never match kitchen colors, and aren't improved by wet hands. "Solve this problem, and women will buy your cleanser," reasoned the Cameo Corporation, Minneapolis.

How they solved it is shown in the photo below. Plaskon was used to mold a colorful sifter-case into which refill packages of Cameo Cleanser are placed. Now the housewife buys several paper packages of Cameo Cleanser, gets a free Plaskon case to match her kitchen or bathroom. It can take its place next to the finest cosmetic package, and it lasts indefinitely because Plaskon resists grease and moisture, can't dent, chip or rust.

Barnes & Reinecke are the designers and Chicago Molded Products, Inc. are the molders.

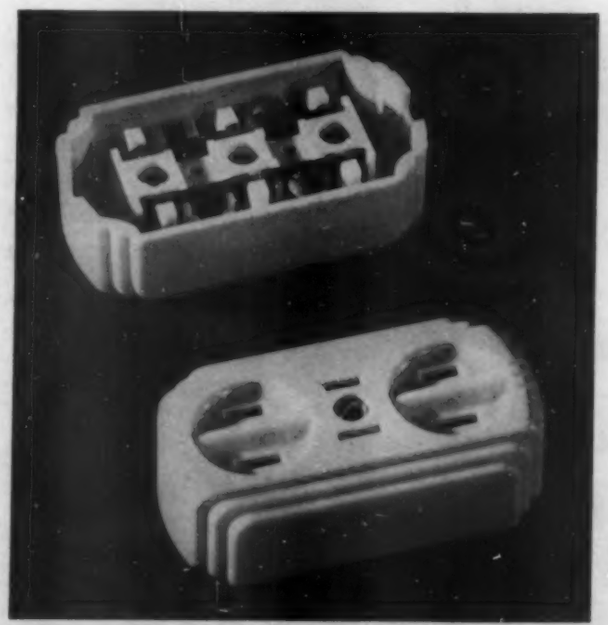
# FEBRUARY 1938

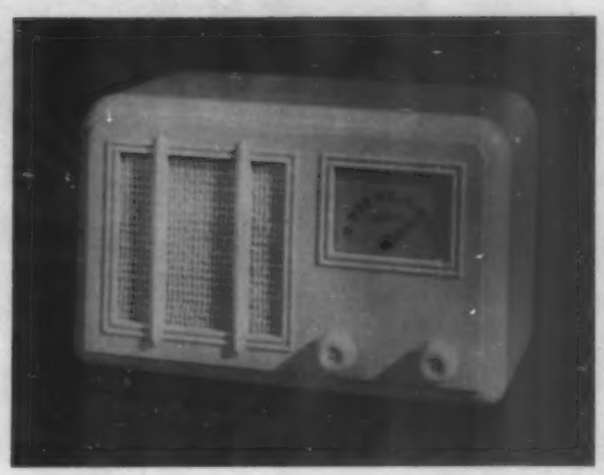
## TRI-TAP:

Latest thing in wiring devices is Eagle Electric Mfg. Company's "Tri-Tap"—a compact triple-outlet molded of Ivory Plaskon.

Ingenious design permits the placing of three outlets in less space than is usually required for two—in a neat attractive case. Inside and out, the "Tri-Tap" is an excellent example of fine, precision molding and mold design. Note the intricacy of the inside portion; how the holes, bosses and terminal lugs are all accurately formed to close dimensional tolerances. Plaskon's contribution is permanent lustre, color, and dielectric strength.

T. F. Butterfield, Inc., is the molder of this ingenious Plaskon wiring device.





## GILFILLAN:

"Cabinet made of Plaskon, in Antique Ivory, Coral, Pearl Gray and Cardinal Red." That's how Gilfillan Bros., Inc., the largest radio manufacturers on the West Coast, describe the cabinet above.

Plaskon—Molded Color—has a surface interest not found in opaque plastics, and hence simple shapes require no costly embellishment to be attractive. Note the smooth contours in this Gilfillan set, molded by Harry W. Hahn Mfg. Co.

And with Plaskon, you can reproduce intricate shapes and designs—accurately—in one operation of the molding press. No slow, costly spraying and baking operations are necessary to get wide range of appealing, permanent colors—with Plaskon.

---

Plaskon is the world's largest selling urea-formaldehyde plastic, molded under heat and pressure in steel molds. Write for suggestions on using Plaskon on your products.

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**PLASKON COMPANY**
INCORPORATED
2121 SYLVAN AVENUE, TOLEDO, OHIO
CANADIAN AGENT: CANADIAN INDUSTRIES LIMITED MONTREAL, P.Q.

ENTRIES FROM MODERN PLASTICS
SECOND ANNUAL COMPETITION

# IN REVIEW

1

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1. A Bakelite box has been molded by the Waterbury Button Co. for Williams Gold Refining Co. This box is light weight, compact and more than adequately packages the Mat Gold. Hard knocks won't mar the molded surface and it is easy to keep clean

●

2. The Wappler Cold Cautery Scalpel housing was redesigned to find a greater market for "bloodless surgery" equipment. An attractive instrument is achieved of Bakelite, molded by Boonton Molding Co. Supporting ribs and bosses formed integral with the housing greatly simplifies assembly and lessens cost

●

3. This Magneto Distributor Cap allows leads to come from the base rather than the conventional side or top. Used on tractor motors in exposed position, side or top terminals are inclined to become entangled with corn or wheat tips. Molded of Textolite for Wico Electric Co.

●

4. The Blade Master, a sharpener which assures a "barber's edge" on a razor blade performs all operations automatically. Quadruple honing surfaces, having three motions, sharpens both edges of the blade at once. The case is molded of Bakelite by Specialty Insulation Co.

●

5. This telegram blank holder is subject to considerable abuse over the period of its expected service. That is why Western Union Telegraph Co. has them molded of Textolite by General Electric Co.

●

6. Although radical in design this Francisco Heater Housing molded in one piece of Bakelite by Recto Molded Products, follows the popular horizontal-parallel construction of today's automobile. Available in several different colors, the housing will not rattle, or rust and weighs less than two pounds

7. A Bakelite frame for William A. Force Co.'s lever numbering machine was employed to improve its appearance and to reduce assembly operations. Molded by Mack Molding Co.

●

8. The Seebasco Corp.'s Electric Vaporizer has a case molded of Bakelite by American Insulator Corp. It contains a heat bulb and medicine dropper. A jar of medicine is screwed to the vaporizer, and a cord plugged into an electric socket heats the preparation quickly

●

9. This molded date stamper of Lumarith made for the Fulton Specialty Co. eliminates former wooden handles and metal sides enclosing continuous bands of numbers. Assembly costs are substantially reduced and appearance is improved

●

10. A display stand light in weight and adaptable to any background is made of curved Celluloid rods by Rex Products Corp. Strong enough to support glass shelves of any reasonable length, it can be adapted to the display of many items, like handbags, jewelry, compacts, etc.

●

11. This "Visioner" combines many desk necessities in a complete unit—alphabetical file, tickler file, perpetual calendar and memo pads. The Bakelite base molded by Recto Molded Products is in walnut, mahogany or ebony colors to harmonize with any desk fittings

●

12. The Parker Pen Co. has combined fabricoid and polished metal in this pen and pencil box with plastics. It is attractive as a gift item and provides a worthy storage space for the pen and pencil on any desk. Molded of Durez by the Gorham Co.

9

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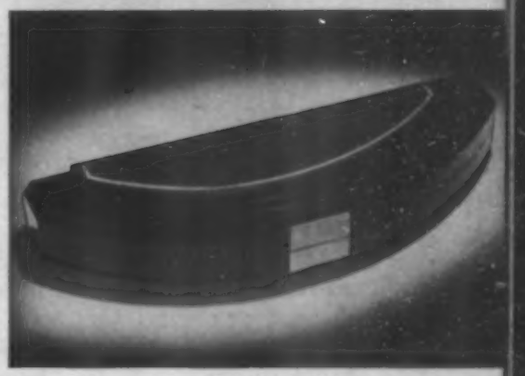
11



12

1 2 MICARTA

# LAMINATED SURFACE DESIGN

by SIDNEY G. WARNER*

**Simplicity of design in these baths is regally expressed through laminated phenolics and ureas**

THESE PHOTOGRAPHS ILLUSTRATE INTERESTing and forward-looking design applications of laminated plastics in two modern bathrooms of "The Home of Tomorrow," Mansfield, Ohio. Admirably suited to the needs and functions of this room, rapid temperature changes, excessive humidity and so on, they proved functionally beautiful and struck an unusual note in bathroom appearance. The design and application were conditioned by the natural qualities peculiar to the material; neither the aping nor the following of conventional bathroom materials or customs was sought for or desired. A plastic has many advantages and desirable qualities of its own; it also has its limitations and restrictions of application. These were understood and considered in a simple, intelligent, straight-forward manner in relation to the room-needs themselves. Conventional bath-fixtures were utilized, and although not aesthetically desirable they do illustrate the fact that specially designed and expensive plumbing fixtures are not necessarily indicated for new treatments.

Laminated surface application in both bathrooms consisted mainly of the glued veneer construction type with stud walls. One inch by three inch strips were nailed to the side of the studs sufficiently to "furr" out the finished wall. These gave a means of straightening crooked studs and making a true plane for the wall surface. Plywood $^3/_8$ in. thick was applied to the entire wall surface by nailing securely to the strips and then the $^1/_{16}$ in. laminated panels were glued to the plywood with a special mastic. As the material came in a limited size (4 ft. by 8 ft. being the largest panel) and cementing limitations had to be considered, the joints between panels were carefully placed as to location and direction for final design appearance. These joints with $^3/_{32}$ in. clearance allowed for expansion and contraction, and provided space to carry the molding track nailed to the plywood. After the material application a satin-silver aluminum snap-on molding (*Please turn to page 68*)

* Art Department, Women's College, University of North Carolina, Greensboro, North Carolina

# STOCK MOLDS

## SHEET FORTY-NINE

**These closures and applicators are available from stock molds and samples will be sent to executives who request them on business stationery**

---

**521.** Jigger cap molded of transparent phenolics. 1 3/8 in. inside diameter, 1 5/8 in. high.

**522.** Jigger cap threaded at top to seal bottle, 1 7/16 in. inside diameter and 1 3/4 in. high

**523.** Jigger cap threaded at bottom 1 7/16 in. inside diameter and 1 3/4 in. high. Decorated top has a sand-blasted emblem

**524.** Trident molded cap. 1 1/16 in. diameter with machined finish. 3/4 in. high

**525.** Closure 7/8 in. diameter and 1 in. high

**526.** Cap with tooth edge 1 in. diameter and 1/2 in. high

**527.** Molded tamper proof cap with Cinzano emblem. The ring #544 fits tightly in the teeth of the cap. 1 1/16 in. diameter and 9/16 in. high

**528.** Closure with machined design 1 in. diameter and 1/2 in. high

**529.** Same as 528 with 1/8 in. opening at top

**530.** Closure with decorated sides 7/8 in. diameter and 3/4 in. high

**531.** Closure 9/16 in. diameter and 5/8 in. high

**532.** Cap 7/16 in. diameter and 3/8 in. high

**533.** Closure with diameter 9/16 in., 3/8 in. high

**534.** Molded cap with internal attachment for applicator 1/8 in. diameter. 9/16 in. diameter and 3/8 in. high

**535.** Threaded cap with internal point seal, 9/16 in. by 9/16 in.

**536.** 1/2 in. diameter, 3/8 in. high, internal point seal

**537.** 1/2 in. diameter, 1/2 in. high

**538.** Sextant design cap 9/16 in. by 7/16 in.

**539.** Cap with internal point seal, 1/2 in. by 3/8 in.

**540.** Same in brown

**541.** Cap with internal point seal, 3/8 in. diameter by 5/16 in. high

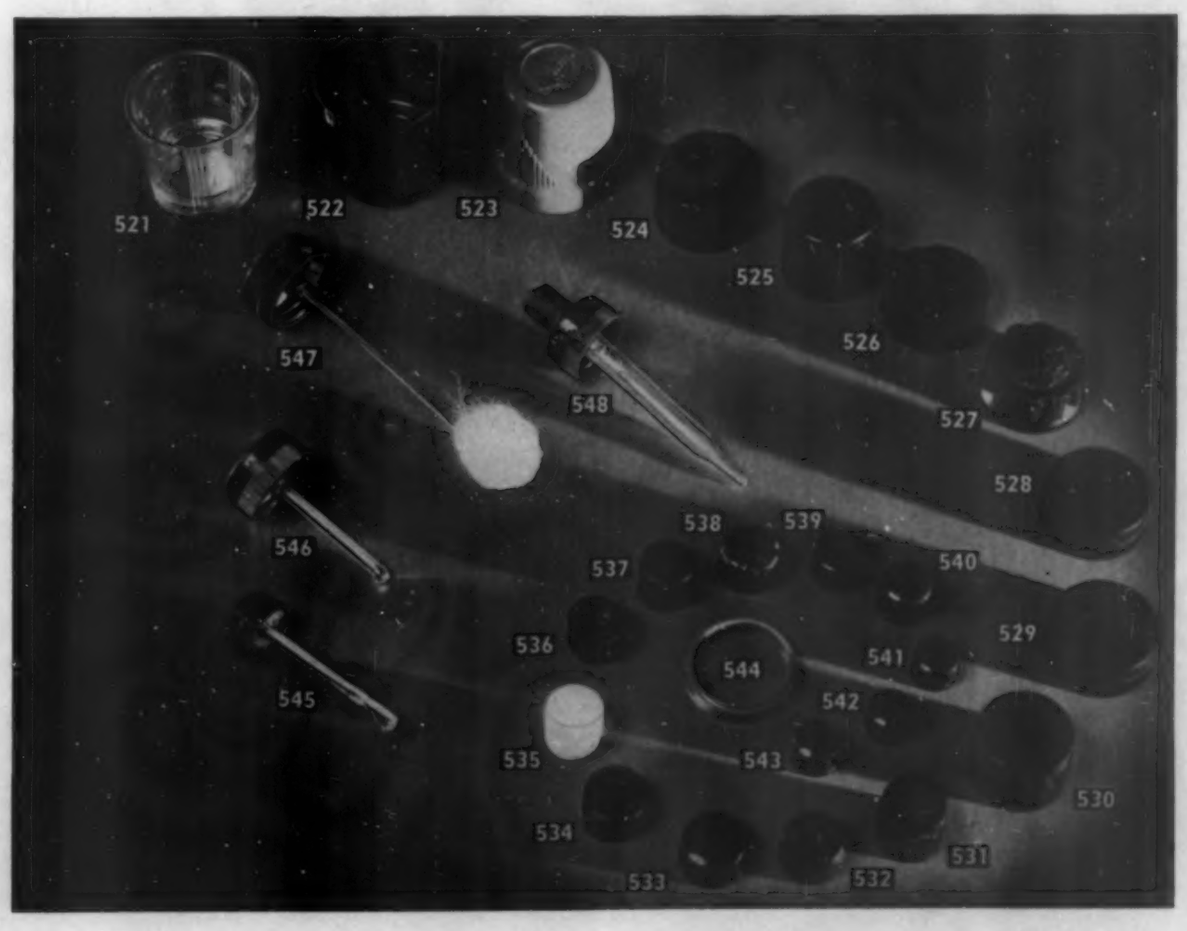
**542, 543.** Same as 541 without seal

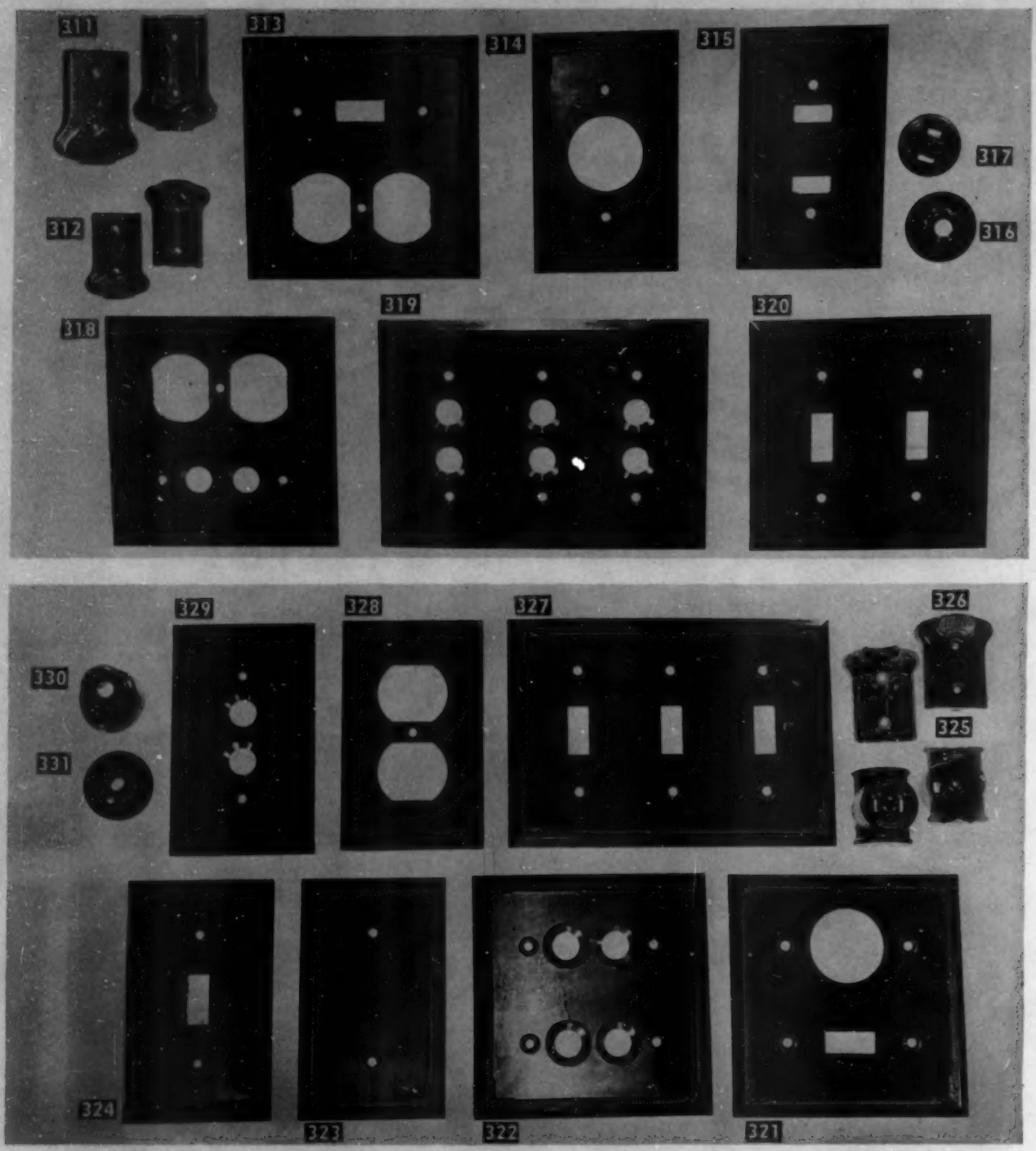
**545.** Brush applicator cap 9/16 in. by 3/8 in.

**546.** Cap 7/8 in. in diameter, 1/2 in. high with glass applicator

**547.** Shoe polish applicator in cap 15/16 in. diameter, 1/2 in. high

**548.** Medicinal dropper in cap 3/4 in. diameter at bottom and 7/16 in. opening at top. Height 7/16 in.






# STOCK MOLDS

## SHEET FIFTY

**311, 312, 326.** Large, medium and small heater plugs
**316, 317, 330, 331.** Attachment plug caps
**325.** Cube tap, standard size

A group of standard type switch plates are also shown for push button and toggle type switches and single or multiple convenience outlets. In requesting samples specify item numbers and colors wanted.

**Address all inquiries to Stock Mold Department, Modern Plastics, 425 Fourth Avenue, N. Y. C.**
**All molders are invited to send samples from stock molds to appear on this page as space permits.**

# TECHNICAL SECTION

# SELECTING PLASTICS BY PROPERTIES

by FREDERICK S. BACON*

TODAY THE PROSPECTIVE USER OF SYNTHETIC resins and plastics faces the bewildering task of selecting from scores of materials offered the one best suited to his purposes. Even ten years ago, the possibilities were practically limited to the natural resins and synthetic thermosetting compounds. In the intervening period the user's range of choice of material has been extended to include a large number of possibilities. These differ through the widest range of properties by such small margins that the task of selection to meet any specified set of conditions has become a very real problem. Necessarily its correct solution depends upon a thoughtful evaluation of the requirements to be met by the product in terms of the properties available in resinous plastics and that in turn must be based upon thorough knowledge of all factors involved.

It is quite impossible within the scope of a single article of this kind to cover fully a subject to which many books are devoted. However, the increasing importance of this problem of selecting resins and plastics to fit specified requirements amply justifies an even more careful analysis than can be given here.

Primary requirements can be broadly divided into these classifications:

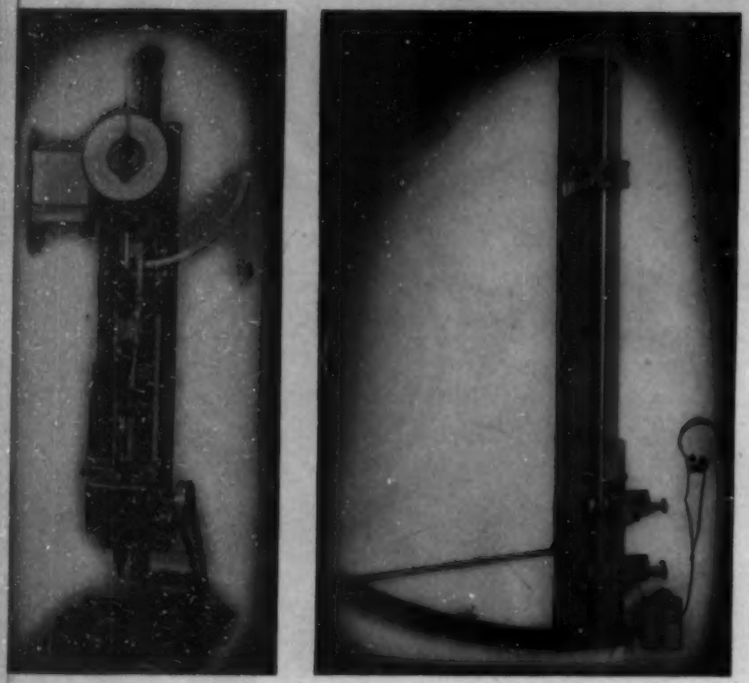
1. Strength, hardness and flexibility.
2. Color characteristics and brilliance.
3. Stability to light, weather and solvents.
4. Temperature characteristics.
5. Electrical properties.
6. Molding and machining characteristics.
7. Cost of resin.
8. Nature and cost of filler.

The prospective application will necessarily establish the relative importance of these various items and immediately limit to some extent the range of the inquiry. In most industrial applications of resinous plastics, strength, wear resistance, and stability under conditions of use are vital, while color, brilliance and appearance characteristics in general are of no special consequence. On the other hand, so long as strength and wear resistance are of easily met minimum values, the fabricator of fancy buttons for women's clothing is primarily interested in color and brilliance in his product. The varnish or lacquer maker is similarly interested in brilliance, but solubility and compatibility characteristics and stability to light and air are even more important to him. The maker of bottle caps requires favorable color characteristics in his plastic, but is interested particularly in ease and cheapness of molding at high speed. The maker of safety glass requires still different qualities in the resinous layer cemented between his glass sheets. Light stability, adhesion, resistance to heat and cold and strength to withstand shock are quite as important in safety glass as absence of color and turbidity.

Obviously the selection of characteristics required in the finished product must be carefully made to prevent being led by too many possibilities on a hopeless wild goose chase. Having once determined these points and

The durability of synthetic resin finishes, even under the most unusual conditions, is demonstrated by the use of dry ice and steaming hot water on a hardwood disc covered with that type of finish at the Du Pont exhibition at the New York Museum of Science and Industry, Rockefeller Center

* Gustavus J. Esselen, Inc.



At the left, tensile tester. Right, rebound tester for measuring elasticity of sample

and established limits to the search, one can with reasonable assurance of success undertake the selective process. Immediately a large number of possibilities can be discarded on the basis of a single property. Often this is cost either of the material or of its fabrication, and on this single basis alone many selections are made, often unwisely. Even expensive resins, having specially valuable characteristics otherwise, can sometimes be applied to solving problems where low cost is vital by the judicious use of proper fillers and diluents. In the same way, the proper compounding of cheap resins with desirable fillers may so modify their properties as to impart special values to them.

Methods of testing resins to specification are yet to be completely standardized. Although the American Society for Testing Materials has standardized methods applicable to plastics for electrical insulation, which are useful for other purposes, the matter of other standards is still incomplete even in tentative form. Under the circumstances, the investigator must rely on these few standard tests and depend for others more specifically related to his problem on a widely scattered literature—albeit well summarized by Ellis in the second edition of "Synthetic Resins"—and on his own experience.

Naturally, testing divides itself into two major parts, chemical and physical. The former deals more particularly with learning the constituents of an unknown mixture and determining its properties where these are important. Physical tests are primarily concerned with determination of values significant in use and for comparison purposes. Chemical analysis of the unmolded material or molding powder of a new plastic yields important information not only as to probable applications of the product but also indicates procedure for modifying its properties by changing the character or proportions of plasticizers, fillers and the like. Chemical tests of the molded product determine its absorption of moisture and its resistance to various destructive agents (oils, acids, alkalies, etc.) to which it may be exposed in use. Still other experiments show its compatibility with dyes, plasticizers and fillers and its resistance to light and humidity conditions.

Physical tests determine tensile, compressive and flexural strength, dielectric constant, impact resistance and the effect of temperature changes on these.

To determine the tensile strength a specially designed test shape is made up according to the A.S.T.M. standards and the resin molded in this form. The test piece is submitted to tensile strength tests. For compressive strength, a cylinder of standard dimensions is molded and the force necessary to destroy the cylinder measured in a compression machine. This factor is necessary in determining the supporting strength of the molded resin. Impact resistance is becoming more important as newer uses are found for resins. Two standard tests determine this property, the Izod Test and the Charpy Test, both of which measure in foot pounds the blow required to fracture the sample. To determine the dielectric strength discs of standard thickness and diameter are molded and placed between electrodes of standard diameter. High voltage is then impressed upon the electrodes and as the voltage is raised, or the time extended, the conditions under which the spark passes through the resin is noted. The phenol-formaldehyde resins have very high dielectric strength but not as high as the polystyrene resin. The latter is a more expensive product at the present time which limits its use in molding work. The plastic yield of a resin or molded compound is the point at which the molding will collapse. This is obtained by raising the temperature until the molding under tests falls together.

The most important among the chemical tests is probably water absorption. It is important to know not only the amount of water absorbed by the molded resin, but also the amount of material which is removed by water, especially in articles which are to be exposed continually or frequently to water. This figure is obtained by soaking the resin for a definite time, weighing the amount of water that is picked up, then drying the sample and again weighing to see how much material was removed by the water. The molded material is also tested with weak acid (dilute hydrochloric and acetic acids) an alkali (both soda ash and caustic soda), and with alcohol, acetone, paraffin oil, benzol, and other solvents. It is quite necessary to test with a paraffin hydrocarbon, particularly if the molded article is to be used in contact with lubricating oils as in automobile ignition and other machine parts. Phenol-formaldehyde and urea-formaldehyde resins are very resistant to all of these tests. Cellulose acetate, vinyl resins, and some others decompose in one or more of the solvents mentioned. The urea-formaldehyde resins have sufficient heat and water resistance to allow their use in kitchen utensils. They are, however, somewhat brittle. (*Please turn to page 46*)

# **Tenite** packages sell more eyecups

*Glasco Non-Spill Eye Bath containers injection-molded of TENITE by Commonwealth Plastics Co.*

EYECUPS are staple articles, pretty much alike. Yet one manufacturer has found a way to make people buy his eyecups in preference to others.

Instead of the ordinary perishable wrapper, he has used a permanent Tenite container.

This unusual container attracts attention. People like its color . . . like the way it protects the eyecup from dirt and breakage. They're even willing to pay a few cents more. Thus Tenite has helped Glasco Products Company keep ahead of competition.

Tenite, a plastic of Eastman cellulose acetate, is tough, practically unbreakable. It comes in all colors —plain, variegated, transparent, opaque. Consider Tenite when you restyle your product. Write for a 52-page book on Tenite and its uses.

♥ ♥ ♥

Tenite representatives: New York: 10 East 40th St.; Chicago: 2264 Builders Building; Detroit: 914 Stephenson Building; Leominster, Mass.: 25 Merriam Ave.; Pacific Coast: W. & G. Meyer & Co., San Francisco: Federal Reserve Building; Los Angeles: 2461 Hunter St.; Seattle: 710 Belmont Pl.

**TENNESSEE EASTMAN CORPORATION, KINGSPORT, TENN.,** ***Subsidiary of Eastman Kodak Company***

# *look to your laurels*

## MESSRS. COOK . . . MODERN PLASTICS HAS A LONG DISTANCE TOUR TO ITS CREDIT, TOO

Modern Plastics is sponsoring the greatest of tours and—in all modesty—the most effective means of educating both the general public and the industrial world to the past accomplishments, the present status and the golden future of plastics and the plastics industry.

From Maine to California . . . . a dozen "plastics caravans" are moving from exhibit to exhibit . . . . presenting to millions the finest products of the plastic arts, the prize winners of the Second Modern Plastics Competition.

And, from coast to coast, returns show that these exhibits have struck a responsive chord . . . . have quickened the public interest . . . . taught industrialists much about these wonderful materials our industry creates and molds to its purpose.

### HERE'S THE ITINERARY . . . .

| STATE | CITY | SPONSOR | DATES |
|---|---|---|---|
| ALABAMA | UNIVERSITY | COLLEGE OF ENGINEERING<br>UNIVERSITY OF ALABAMA | NOVEMBER 4–18 |
| CALIFORNIA | BERKELEY | DEPT. OF MECHANICAL ENGINEERING<br>UNIVERSITY OF CALIFORNIA | OCTOBER 1–30 |
| CALIFORNIA | SANTA CLARA | COLLEGE OF ENGINEERING<br>UNIVERSITY OF SANTA CLARA | NOVEMBER 1–12 |
| COLORADO | DENVER | DEPARTMENT OF CHEMISTRY<br>UNIVERSITY OF DENVER | FEBRUARY 7–19 |
| CONNECTICUT | BRIDGEPORT | THE BRIDGEPORT ENGINEERING INSTITUTE | JANUARY 17–30 |
| DELAWARE | WILMINGTON | E. I. DU PONT DE NEMOURS & CO. INC.<br>DUPONT HOTEL LOBBY WINDOW | DECEMBER 18–<br>JANUARY 7 |
| DISTRICT OF COLUMBIA | WASHINGTON | SCHOOL OF ENGINEERING<br>THE GEO. WASHINGTON UNIVERSITY | MAY 11–27 |
| ILLINOIS | CHICAGO | ARMOUR INSTITUTE OF TECHNOLOGY | MAY 17–31 |
| INDIANA | INDIANAPOLIS | INDIANAPOLIS CHAMBER OF COMMERCE<br>(AT L. S. AYRES & CO. DEPT. STORE) | MARCH 26–APRIL 9 |
| | TERRE HAUTE | TERRE HAUTE CHAMBER OF COMMERCE | JUNE 1–15 |
| IOWA | DES MOINES | DES MOINES CHAMBER OF COMMERCE<br>(AT YOUNKER'S DEPARTMENT STORE) | JANUARY 17–<br>FEBRUARY 1 |
| KANSAS | LAWRENCE | DEPT. OF MECH & IND. ENG.<br>UNIVERSITY OF KANSAS | MAY 6–20 |
| LOUISIANA | NEW ORLEANS | NEW ORLEANS ASS'N. OF COMMERCE | DECEMBER 12–25 |
| | NEW ORLEANS | COLLEGE OF ENGINEERING<br>THE TULANE UNIVERSITY OF LOUISIANA | NOVEMBER 25–<br>DECEMBER 9 |
| | UNIVERSITY | COLLEGE OF ENGINEERING<br>LOUISIANA STATE UNIVERSITY<br>(ENGINEERING DAY) | MAY 1–15 |
| MAINE | ORONO | DEPT. OF CHEM. & CHEM. ENG.<br>UNIVERSITY OF MAINE | OCTOBER 1–15 |
| MARYLAND | BALTIMORE | ENOCH PRATT FREE LIBRARY | JUNE 1–JULY 15 |
| MASSACHUSETTS | BABSON PARK | BABSON INSTITUTE<br>COLLEGE OF BUSINESS ADMINISTRATION | FEBRUARY 1–12 |
| | BOSTON | BOSTON UNIVERSITY<br>BUSINESS BRANCH THE PUBLIC LIBRARY | MARCH 7–18<br>FEBRUARY 15–<br>MARCH 5 |
| | BOSTON<br>CAMBRIDGE | DEPT. OF BUSINESS & ENG. ADMINIS.<br>MASS. INST. OF TECHNOLOGY | MAY 18–30 |


| STATE | CITY | SPONSOR | DATES |
|---|---|---|---|
| MICHIGAN | ANN ARBOR | DEPT. OF METAL PROCESSING UNIVERSITY OF MICHIGAN | FEBRUARY 17–MARCH 1 |
| | DETROIT | AMERICAN SOCIETY OF TOOL ENG., INC. (ANNUAL MEMBERSHIP MEETING) | MARCH 7–19 |
| | DETROIT | THE PUBLIC LIBRARY TECHNOLOGY DEPARTMENT | JANUARY 17–FEBRUARY 1 |
| | FLINT | FLINT INSTITUTE OF ARTS | JANUARY 1–15 |
| | GRAND RAPIDS | GRAND RAPIDS ASSN. OF COMMERCE | FEB. 24–MARCH 10 |
| | HIGHLAND PARK | COLLEGE OF ENGINEERING LAWRENCE INST. OF TECHNOLOGY | FEBRUARY 7–19 |
| NEBRASKA | LINCOLN | DEPARTMENT OF FINE ARTS UNIVERSITY OF NEBRASKA | APRIL 15–29 |
| NEW HAMPSHIRE | HANOVER | DARTMOUTH COLLEGE MUSEUM | MARCH 21–APRIL 2 |
| NEW JERSEY | TRENTON | TRENTON CHAMBER OF COMMERCE | JANUARY 1–15 |
| NEW YORK | BROOKLYN | POLYTECHNIC INST. OF BROOKLYN COLLEGE OF ENGINEERING | JANUARY 10–27 |
| | ITHACA | CORNELL UNIVERSITY DEPARTMENT OF RETAILING | APRIL 23–MAY 9 |
| | ROCHESTER | ROCHESTER ATHENAEUM & MECH. INST. DEPARTMENT OF CHEMICAL ENGINEERING | APRIL 16–27 |
| | TROY | RENSSELAER POLYTECHNIC INSTITUTE COMMUNITY ARTS PROGRAM | MAY 1–14 |
| | UTICA | MUNSON-WILLIAMS-PROCTOR INSTITUTE | NOVEMBER 1–15 |
| OHIO | AKRON | UNIVERSITY OF AKRON | APRIL 1–8 |
| | CINCINNATI | OHIO MECHANICS INSTITUTE | APRIL 12–26 |
| | CINCINNATI | SCHOOL OF APPLIED ARTS UNIVERSITY OF CINCINNATI | FEBRUARY 1–12 |
| | CLEVELAND | CLEVELAND CHAMBER OF COMMERCE | MARCH 14–26 |
| | COLUMBUS | DEPT. OF CHEMICAL ENGINEERING THE OHIO STATE UNIVERSITY | NOVEMBER 20–DECEMBER 5 |
| OKLAHOMA | OKLAHOMA CITY | OKLAHOMA CITY CHAMBER OF COM. | JUNE 1–20 |
| | STILLWATER | DIVISION OF ENGINEERING OKLA. AGRIC. & MECHANICAL COLLEGE | NOVEMBER 25–DECEMBER 15 |
| OREGON | CORVALLIS | SCHOOL OF ENG. & INDUSTRIAL ARTS OREGON STATE COLLEGE | APRIL 1–9 |
| | PORTLAND | PORTLAND CHAMBER OF COMMERCE | NOVEMBER 15–29 |
| PENNSYLVANIA | PITTSBURGH | DEPT. OF CHEMICAL ENG. & CHEM. CARNEGIE INSTITUTE OF TECHNOLOGY | OCTOBER 19–26 |
| | | DEPT. OF MECH. ENGINEERING UNIVERSITY OF PITTSBURGH | JANUARY 1–15 |
| | SCRANTON | SCRANTON CHAMBER OF COMMERCE | APRIL 8–20 |
| TEXAS | AUSTIN | DEPT. OF MECH. ENGINEERING UNIVERSITY OF TEXAS | NOVEMBER 4–20 |
| | COLLEGE STATION | AGRIC. & MECH. COLLEGE OF TEXAS | OCTOBER 19–31 |
| | LUBBOCK | DIVISION OF ENGINEERING TEXAS TECHNOLOGICAL COLLEGE | OCTOBER 1–15 |
| UTAH | SALT LAKE CITY | CHAMBER OF COMMERCE & COM. CLUB | FEBRUARY 24–MARCH 10 |
| VIRGINIA | BLACKSBURG | SCHOOL OF ENGINEERING VIRGINIA POLYTECHNIC INST. | OCTOBER 19–31 |
| | CHARLOTTESVILLE | DEPARTMENT OF ENGINEERING UNIVERSITY OF VIRGINIA | OCTOBER 1–15 |
| WASHINGTON | SEATTLE | DEPT. OF CHEM. & CHEM. ENG. UNIVERSITY OF WASHINGTON | DECEMBER 1–15 |
| | SPOKANE | SPOKANE CHAMBER OF COMMERCE | MARCH 14–26 |

As of January 17th. Additional Exhibits are being arranged at the rate of eight per week.

## AND HERE'S A SAMPLE OF THE RESPONSE

I am not a window shopper, but when a group of men and women stand "six deep" to look at bank windows, I'm going to elbow my way in and look too.

The Plastic display in the windows of the Farmers Deposit National Bank, 5th and Wood Streets, Pittsburgh, was certainly telling a story—a fantastic, mysterious, enlightening story. After talking to Mr. Marty of this fine banking institution, I am assured that this plastic display is causing no end of discussion.

I have a particular problem of my own that might be worked out in plastics. I would like to have manufactured a plastic tubular reservoir, very similar to a fountain pen. The plastic must not be affected by alcohol. Could you please tell me:

A. Is there a plastic that is not affected by alcohol?

B. What companies would process this plastic?

J. L. Parkinson, Jr.
International Merchants Supply Co.

There was considerable interest evidenced in the Modern Plastics exhibit. It was particularly pleasing to note numerous industrial engineers who came to this office to view the exhibit. Last evening the employees of Panelyte Corporation (a plastics industry) collectively viewed the exhibit under the personal direction of Mr. Frank H. Tupper, manager of the Trenton plant.

W. O. Lochner
Trenton Chamber of Commerce

The exhibit has created quite an interest. We advised various engineers and industrialists here in Flint regarding this show. They have responded well. Newspaper comment has been favorable. I am enclosing a clipping from one of the newspapers.

A recent radio talk over WFDF of Flint emphasized the value of plastics in industry. Last year Mr. Ragsdale, engineer at Buick, cooperated with us in an Industrial Arts Show held here at the Institute by exhibiting some of the raw materials, transition stages of manufacture, and finished products of various types of plastics used in the auto industry.

L. Dirk Van Dyke
The Flint Institute of Arts

This exhibit was on display in the Wilmington Exhibit from December 27 to January 6, during which time it attracted unusual attention.

W. H. Uffelman
E. I. duPont de Nemours & Company, Inc.

Your display attracted unusual attention, and we received many comments regarding it.

W. Howard Martin
Farmers Deposit National Bank

## TO ARRANGE ADDITIONAL BOOKINGS - - - WIRE

# MODERN PLASTICS

425 FOURTH AVENUE · NEW YORK, N. Y.

**Color characteristics**

Very light colors (pastel shades) suggest a urea-formaldehyde or cellulose acetate binder. A colorless product might be a phenol-formaldehyde (cast resin) or one of the newer acrylates. Polystyrene also gives light colored clear resins. The transparent phenolics are as a rule somewhat yellowish in color. The urea-formaldehyde resin has a complete rainbow range of color, and is one of the most outstanding resins in this respect. Cellulose acetates, too, have a wide range of color. Brilliance of finished product is more often due to having a perfectly smooth, clean mold than to the refractive index of the material itself. Even small scratches or particles of dirt or lint will destroy the brilliance of a finished piece. Despite this, high refractive index permits an improved brilliance over a resin whose index is low.

Plasticity is determined by placing a known amount of material in a small die to which a uniform pressure is applied, and noting the temperature at which the material will flow. This, of course, is highly important for thermoplastic resins. Thermosetting materials are heated to the prescribed molding temperature for this test and pressure applied until extrusion begins. Using a predetermined standard extrusion rate, a curve can be plotted showing changes of pressure necessary to obtain this rate of flow. As time goes on, the thermosetting resin will gradually harden and stop this flow. Thermoplastic resins are, of course, sensitive to heat both before and after molding, and a satisfactory resin must be of sufficient hardness not to show any signs of deformation at about 120 deg. F. (or at higher temperature of use) so that the molded article will hold its shape.

The economies of molding are of some importance. If a resin has too little shrinkage to allow it to be easily removable from the mold, the expense of molding goes up. Some synthetic resins have unusually fine molding properties, and can be used for molding extremely accurate mechanical and electrical parts. For this purpose, the coefficient of expansion must be at a minimum. Both the molding character and the coefficient of expansion are modified by the filler chosen.

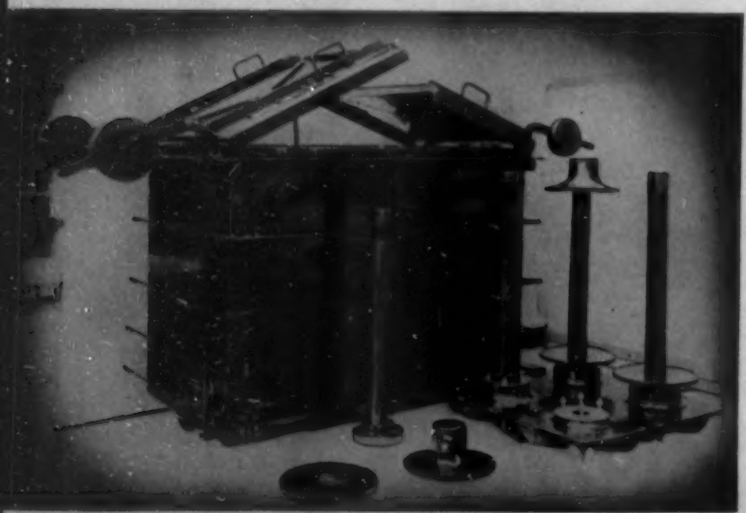
Five types of fillers are used in considerable quantity, the largest being woodflour, the all-purpose filler. Woodflour is not good for light shades, but is a good reinforcing agent. Bleached wood fiber flock can be used in light shades and white. If great mechanical strength is desired as in gears, canvas is the filler used. Cotton flock is used to a limited extent, but it is sensitive to heat and is somewhat difficult to work on account of its tendency to lump. Unusually good heat resistance is imparted by asbestos, carefully and finely shredded. Asbestos tends to reduce the mechanical strength of the resin and also its dielectric strength, on account of particles of iron which it may contain. For dielectric work, mica is one of the most satisfactory fillers. Other inorganic materials (barium sulfate, gypsum, China clay, kieselguhr, and others) are often valuable.

Accelerated aging tests determine whether the resin had been fully set (thermosetting) or whether the polymerization of the vinyls and acrylates had stopped at the proper point. Vinyls are sensitive to heat. Phenol-formaldehyde resins stand up extremely well. The cellulose acetates are also very stable. Urea-formaldehyde resins are more likely to become brittle on aging than many of the others.

As for the cost of fabrication and the cost of the resins, the phenol and urea-formaldehyde resins as a rule are among the cheapest. The cellulose acetates and vinyl classes come next and the highest cost classes, at present are the acrylates and the styrols.

Obviously, by selecting resins carefully on the basis of the specific requirements of use and applying them wisely in compounds adapted to each application, the industry of plastics has much to gain. By careful analysis of conditions of use, specific properties may be quite definitely determined. With the increasing variety of resins now available in the market and being constantly developed in greater numbers by research, the prospective user can reasonably expect his purposes to be well served. The growing numbers of resins available to molders give him enlarged opportunity but at the same time place upon him a greater responsibility to meet his customers' needs more exactly.

Below is a top dyeing machine made of synthetic resin, especially useful when a sufficiently resistant plastic is used. Courtesy Haveg Corp. At the bottom, compression tester. Testing instruments used in these illustrations, courtesy Henry L. Scott & Co.



# MOLDS FOR PHENOL RESINOIDS

by T. E. CASSEY*

**Continued from our January issue and reprinted by permission from August 1937 issue Journal of The American Society of Naval Engineers**

COMING NOW TO THE POSITIVE MOLD, IT IS OF particular interest to note that the basic principle of this type of mold is quite different from that of the flash type. As previously mentioned flash molds have their cavities cut in the chase to the exact depth of the finished piece. In positive molds, on the other hand, the cavities are formed deep in the chase, the aperture thus formed above the cavity, constituting the loading chamber and acting as a pressure cylinder in which the force plug descends.

Positive molds may be generally characterized as a type of mold in which the force plug telescopes with the mold cavity.

Under the classification of "positive molds" are found the following subtypes:

Truly positive
Landed positive
Semi-positive
Sub-cavity.

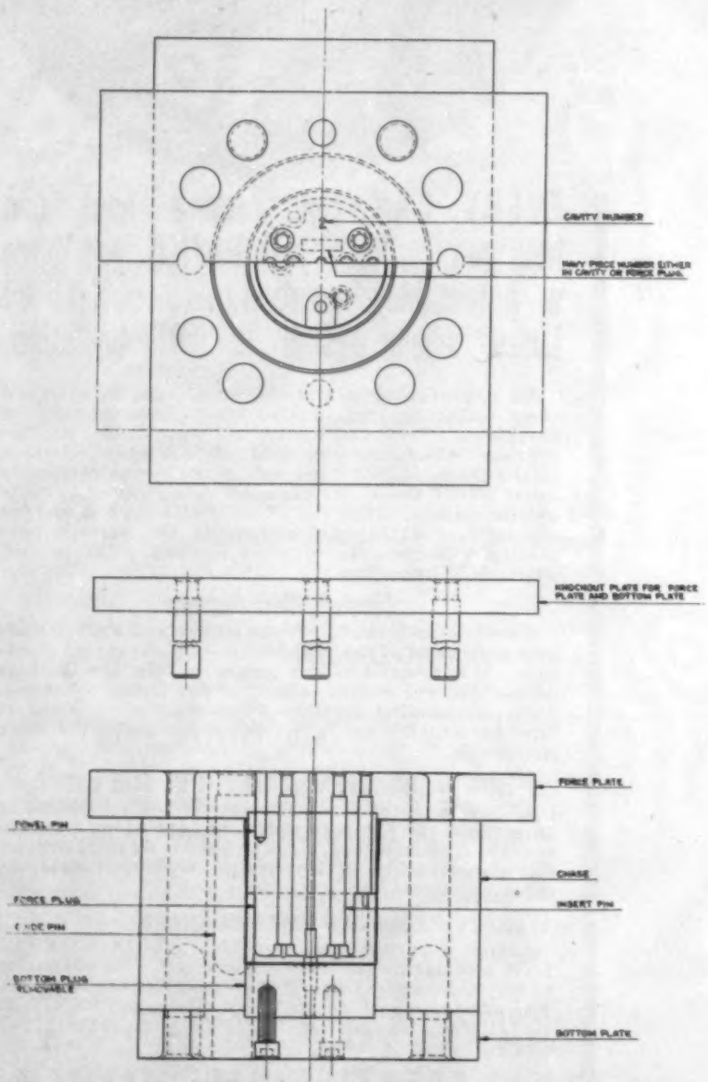
### Truly positive molds

The truly positive type of mold is of a type distinct in itself. There being no restriction to the movement of the force plug in the pressure cylinder, the full molding pressure is exerted positively upon the molding charge and upon the molded piece at the final closure of the mold. Hence the name "truly positive." There is a close analogy between a truly positive mold and a piston in a cylinder.

With a given mold pressure, the final dimensions of the molded piece depend upon the weight of the charge. There is required, therefore, an exact measurement of the mold charge to obtain accuracy and uniformity of the dimensions of the finished pieces.

Truly positive molds require a relatively deep chase to provide sufficient loading area within the pressure cylinder above the cavity. In general, this area must be from 2 to 8 times the finished piece depending upon the type of material used. There is only a slight vertical fin formed on the finished piece with this type of mold.

Loading the truly positive type of mold, for the powder materials, is a simple matter, as the exact amount of material is merely poured into the aperture above the cavity. For the fabric base, high impact materials the loading of the mold introduces a serious design problem due to the high bulk factor of the material. To provide sufficient area in the loading aperture for this high bulk factor requires a very deep chase which adversely influences the heating and operating characteristics of the mold as well as the weight and cost. High impact materials, therefore, used with truly positive molds preferably should be preformed. (*Please turn to the next page*)




BUILT UP CONSTRUCTION, INDIRECT HEATED, HAND, SINGLE CAVITY, TRULY POSITIVE, COMPLETE CLOSURE, KNOCKOUT PLATE EJECTING MOLD.
FIG. V.

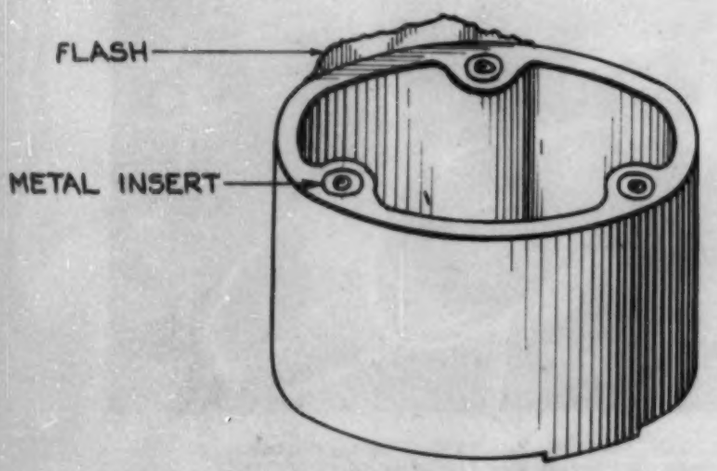
* Chief Electrical Draftsman of the Bureau of Engineering, Navy Dept.

Ejection of the piece in the truly positive mold is generally done by means of knockout pins. In some instances the lower force plug may be made removable, and the piece ejected by moving the chase relative to the upper or lower force.

Fig. 5 shows the arrangement and principal design features of the Truly Positive Mold, Built-Up Construction, Indirect Heated, Hand, Single Cavity, Complete Closure, Knockout Plate, as required for the production of molded pieces of high impact material for Naval work. The increase in the overall height of the mold assembly over the Flash Overflow type is noticeable. The force plate and bottom plate are similar to the Flash Mold. The force plug is recessed in the force plate $^1/_8$ inch, and is doweled and secured to this plate by machine screws as in the case of the Flash Filler Plate Mold.

The force plug telescopes with the aperture in the chase and as will be seen conforms in its shape to the piece to be molded. It has been the practice for this type of mold, in order to ease the movement of the force plug within the chase, to have the cylindrical surface of the force plug relieved by a series of flattened faces spaced equally; a bearing face the full diameter of the force plug is left between the flattened faces of not less than $^3/_{16}$ inch. These flattened sections do not extend closer to the molding face of the force plug than $^3/_{16}$ inch and extend to within not less than $^3/_{16}$ inch of the top of the force plug. As a substitute for this, it has lately been agreed that for round pieces requiring deep draws, the chase of the mold should have a taper of about 1 degree to a point $^1/_8$ inch above the position of the piece when molded; above this point the chase is straight.

It will be noted that the bottom of the cavity is formed by a bottom plug set deeply in the chase, which is secured to the bottom plate in the same manner as the force plug is secured to force plate. The area within the aperture above the bottom of the cavity is shown in the ratio of 5.2 to 1 with that of the finished piece. This ratio or bulk factor has been found satisfactory for C. F. I. loose material so far as loading the mold is concerned. Very recently a decision has been reached that since Type C. F. I. material can be used in special loose preforms, and moreover since the use of these preforms will improve the quality of the piece, this type of mold may be based on the reduced bulk factor of 2.5 to 1. In this case the die for these special preforms will be considered a part of the mold equipment. This decision will have a beneficial effect on the design of the truly positive mold.




MOLDED BOX

**FIG. VI.**

The chase rests on the bottom plate, positioned by guide pins as in the case of the Flash Overflow Mold. Guide pins are also provided to position the force plate in its movement which also relieves the force plug of lateral strains and reduces wear in the cylinder walls. In Fig. 5 are shown insert holding pins, hole forming pins and the manufacturer's monogram pin. It is important to notice the extreme length of the insert holding and the hole forming pins relative to their diameter. This is one of the vulnerable points of the truly positive mold. As the chase is deepened, so these pins increase in length. Being of small diameters, and being subject to tremendous lateral pressures as the mold closes, these pins frequently shear off causing a rejection of the piece and of more consequence, requiring a repair operation on the mold. If these pins break off close to the force plate their renewal is a troublesome matter. This breakage of pins presents one of the most effective arguments against the deep chase of the truly positive mold. Fig. 5 shows a knockout plate for removing the force and bottom plates, but no knockout plate is shown for ejecting the piece.

Due to its construction, the truly positive mold is expensive to manufacture as the machining of the cavity at the bottom of the pressure cylinder is a tedious and delicate operation. In addition to high cost, the truly positive mold has the following other disadvantages:

Excessive weight.

Relatively poor heating characteristic, when of indirect heated type, due to the long path of heat conduction.

Slow production.

Difficulty of placing inserts.

Requires accurate weighing of material (when loose material is used).

Depends greatly upon the human element for proper operation.

Greater cost of maintenance.

For commercial molding the truly positive mold is primarily useful for handling loose material and for molding large pieces containing numerous inserts, where it is impracticable to produce preforms and where the loading time is a small fraction of the molding cycle.

For Naval production, in spite of all the disadvantages mentioned, the truly positive mold stands as the one type of mold that has the ability to produce molded pieces of the high uniform density required to pass inspection tests. Its chief weakness for Naval work lies in the possibility, when loose materials are used, of variation in the weight of the charge "creeping in," even under the most careful supervision. (*Please turn to page 72*)

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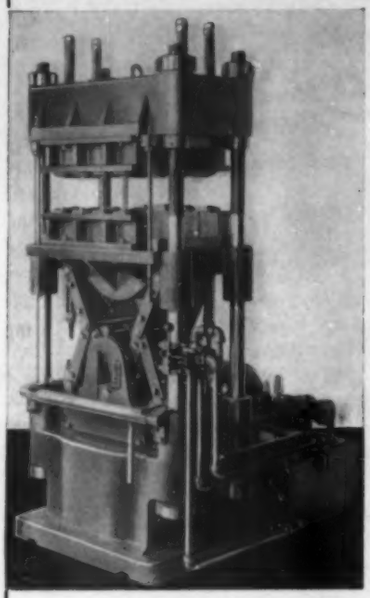
*for Plastic Molders*



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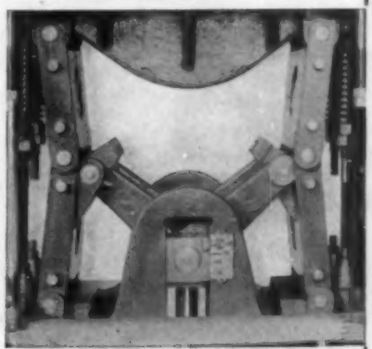

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# PLASTICS DIGEST

**This digest includes each month the more important articles (wherever published) which are of interest to those who make plastic materials or use them**

## General

RECENT DEVELOPMENTS IN SOLVENTS AND PLASTICIZERS. E. H. Brittain. Chem. Age (London) *37*, 534–5 (Dec. 25, 1937). Benzyl butyl phthalate, trivinyl urea, divinyl phthalate, tributyl phosphate, sucrose octa-acetate, and the ethers of mannitol and sorbitol are among the new chemicals listed.

PLASTICS. T. Smith Taylor. Can. Chem. and Met. Eng. *21*, 398–402 (Dec. 1937). A detailed abstract of the Edgar Marburg Lecture presented at the A.S.T.M. meeting in New York, July 1937, consisting of a general review of the properties of the various commercial plastic materials.

A REVIEW OF PRODUCTION AND TECHNICAL PROGRESS IN THE PLASTICS INDUSTRY. H. Barron. Chem. Age (London) *38*, 7–8 (Jan. 1, 1938).

PRODUCTION OF PAPER FOR LAMINATED PLASTIC MATERIAL. British Plastics *9*, 334–5 (Dec. 1937). For high-class absorbent papers for use in the manufacture of translucent and light-colored panels in conjunction with phenolic or urea resins, the principal raw materials are rags and bleached wood pulp. The papers are tested for bursting strength, bulk, water absorbency, methyl alcohol absorbency, and other properties covered in rigid specifications.

## Materials and manufacture

INSULATION: MATERIALS AND APPLICATIONS. E. L. Doty. Elec. J. *34*, 445–8, 489–92 (Nov. and Dec. 1937). Review of the materials used for insulation purposes, including asbestos, mica, glass, cotton and paper, varnishes, shellac, and phenolic resins. The properties indicated as of most importance in insulating materials are dielectric strength, insulation resistance, dielectric loss, specific inductive capacity, acid resistance, mechanical strength, flexibility, hygroscopicity, heat conductivity, and deterioration from heat.

RESINS FROM UNSATURATED ALDEHYDES AND ACIDS. British Plastics *9*, 336–7 (Dec. 1937). The preparation of resins from acrolein, derived from glycerol, and crotonaldehyde, derived from acetaldehyde, by condensation with phenol or aniline.

SOME NEW THERMOPLASTIC MATERIALS. Plastics *1*, 267–8 (Dec. 1937). A description of the properties and applications of Mipolam, Astralon, and Oppanol, which are vinyl resins. Drawing instruments made with transparent, non-hygroscopic Astralon are illustrated as well.

HYDROGEN ION CONCENTRATION IN THE MANUFACTURE OF UREA RESINS. M. Déribéré. Rev. Gén. Mat. Plastiques *13*, 293–6 (Oct. 1937). A review.

SULFUR IN UREA-FORMALDEHYDE RESINS. P. Berrier. Rev. Gén. Mat. Plastiques 13, 296–8 (Oct. 1937). A discussion of patents pertaining to the introduction of sulfur compounds into the urea and formaldehyde reaction mixture in order to produce a resin resistant to ultraviolet light and spontaneous cracking.

EVALUATION OF ETHYLCELLULOSE SOLVENTS. T. A. Kauppi and S. L. Bass. Ind. and Eng. Chem. *30*, 74–79 (Jan. 1938). Solvents for ethylcellulose have been evaluated on the basis of solution viscosity and clarity, and the physical properties of films deposited from them.

ETHYLCELLULOSE FILMS. S. N. Ouchakow, I. M. Schneer, E. N. Djemina, and C. Ijboldina. Rev. Gén. Mat. Plastiques *13*, 301–4 (Oct. 1937). Experiments with various solvents and plasticizers for ethylcellulose are described. Adipic acid esters diminished the mechanical strength, whereas hexachlordiphenyl increases the strength of low viscosity ethylcellulose.

FLEXIBILITY OF FILMS OF CELLULOSE MIXED ESTERS. R. Peroldi-Ciacca. Rev. Gén. Mat. Plastiques *13*, 307–11 (Oct. 1937). Review of patents relating to the effect of solvents and plasticizers on films of cellulose acetopropionate. Solution of this ester in propylene chloride and methyl alcohol (90:10) with and without 15% of triphenyl phosphate gave films of equal flexibility. Heating for 4 days at 100° had little effect on these films, indicating that residual solvent was not responsible for the flexibility of the unplasticized film. This inherent flexibility is of particular interest because it facilitates reuse of the material and does not involve change of properties with loss of plasticizer.

## Molding

PRODUCTION-WISE MOLDING. H. Chase. Am. Mach. *81*, 1146–8 (Dec. 1, 1937). A description of the molding plant of the General Industries Company.

## Applications

BUSINESS ON THE DOORSTEP MADE POSSIBLE WITH PLASTICS. Plastics *1*, 261 (Dec. 1937). A portable Automaticket machine weighs when fully loaded 3½ pounds. Duplicate receipts are retained in the locked molded box. This provides a simpler and safer method of account collection.

SYMPOSIUM ON INDUSTRIAL EXPERIENCE WITH BEARINGS OF LAMINATED PLASTICS. Kunststoffe *27*, 312–26 (Dec. 1937). The following papers and authors were included in this program: Experiments with grease-lubricated plastic bearings, by G. Barner; Plastic bearings in crane construction, by E. Lehr; Use of plastic bearings in railway equipment and locomotives, by E. Heidebroek; Plastic bearings in agricultural machinery, by O. W. Meboldt; Physical-chemical influence of lubricants and cooling agents on plastic bearings, by P. Beuerlein and A. Reinartz; Tolerances of plastic bearings, by G. Barner.

1725 ACRES OF SAFETY GLASS FOR U. S. CARS. Automotive Ind. *77*, 740–4 (Nov. 20, 1937). In addition to laminated glass, other products considered include tempered glass, made by heating ordinary glass to 1100° F. and chilling quickly with jets of air, Solex glass, a new type of plate glass which will absorb heat and transmit sunlight, and fibre glass which is used for thermal insulation and filtering medium.

SOME POSSIBILITIES OF SHELLAC AS A MOLDING PLASTIC. A. J. Gibson. Chem. and Ind. (London) *56*, 1160–1 (Dec. 25, 1937). An abstract and discussion of a paper dealing particularly with "hard lac resin" separated from shellac by solvent extraction.

## Testing

MICROTOMIC WAFERS REVEAL CABLE VOIDS. K. S. Wyatt, D. L. Smart, and J. M. Reynar. Elec. World *108*, 1874–5 (Dec. 4, 1937). Impregnation of the cable with liquid styrene and subsequent polymerization permits thin sections of the cable to be cut with a microtome. Thus, the degree of physical uniformity of cable insulation can be observed, permitting correlation of electrical stability with uniformity of mechanical assembly.

THE STRENGTH OF PHENOLIC MOLDINGS AT HIGH TEMPERATURES. R. Houwink. British Plastics *9*, 351 (Dec. 1937). Experiments dating back to 1928 showed that phenol and cresol resin molding compositions undergo rapid decreases of tensile and bending strengths with increasing temperature. The loss of strength was approximately one-half in going from 20° to 100° and one-third to one-fourth in going from 20° to 200° C.

## Chemistry

CONDENSATION OF PHENOLS WITH FORMALDEHYDE. IV. VARIATION OF PHENOLS. F. S. Granger. Ind. and Eng. Chem. *29*, 1305–8 (Nov. 1937). A review of the effect of various phenols on the reactivity, curability, and solubility in various liquids, including varnish oils, of resins prepared from these phenols by reaction with formaldehyde.

DIELECTRIC PROPERTIES OF INSULATING MATERIALS. E. J. Murphy and S. O. Morgan. Bell System Tech. J. *16*, 493–512 (Oct. 1937). A qualitative account of the way in which dielectric constant and absorption data have been interpreted in terms of the physical and chemical structure of materials.


# . . . . . Beware of Industry's "YES MEN"

Every salesman has met at least one prospect (?) who agreed with his every word—but still couldn't be sold.

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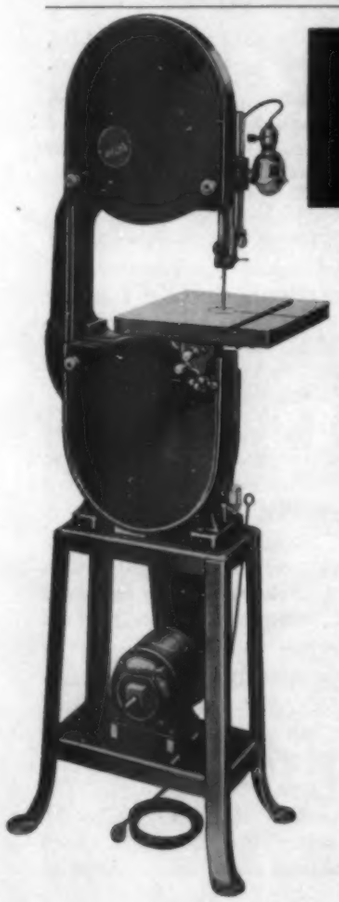

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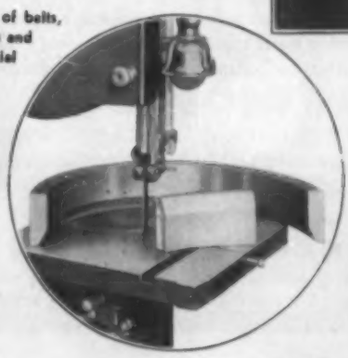

One of these draw-die segment rings was impractical to cut on the milling machine because of the diameter of cutter required; the other because the diameter of the ring was too large for the milling machine. Both, however, are cut with ease and speed on the Delta band saw. Try your next "awkward" job on one of these versatile tools.

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# U. S. PLASTICS PATENTS

**Copies of these patents are available from the U. S. Patent Office, Washington, D. C., at 10 cents each**

CASTING RESINS. W. E. Gordon (to E. I. du Pont de Nemours and Co.). U. S. 2,101,061, Dec. 7. A sirup for casting synthetic resin shapes comprises unpolymerized acrylate or methacrylate esters containing in solution at least 1% of the polymerized material.

COATED FABRICS. C. B. Hollabaugh (to Hercules Powder Co.). U. S. 2,101,066, Dec. 7. A nitrocellulose emulsion for coating fabrics or other porous materials is made by emulsifying a solution in water, using a nitrocellulose of such viscosity as to leave, on drying, a continuous coherent film with little penetration into the porous base.

MOLDING COMPOSITIONS. D. E. Strain (E. I. du Pont de Nemours and Co.). U. S. 2,101,107, Dec. 7. Simultaneous molding and polymerization of methacrylate esters by mixing the partially polymerized ester with its monomeric form and heating in a mold, at least at 80°C.

COATED METAL FOIL. H. G. Kittredge and F. W. Williams (to Foilfilm, Inc.). U. S. 2,101,182, Dec. 7. A structurally weak metal foil is covered with a baked vinyl acetate or phenolic resin varnish.

AMINE-ALDEHYDE RESINS. G. D. Graves and J. Harmon (to E. I. du Pont de Nemours and Co.). U. S. 2,101,215, Dec. 7. Moderately acid-soluble resins are made by condensing a mixture of aniline and n-butylamine in presence of phthalic anhydride, then acidifying.

RESINS. W. Frankenburger, H. Hammerschmid and G. Roessler (to I. G. Farbenindustrie Aktiengesellschaft). U. S. 2,101,332-3, Dec. 7. Aldehyde resins are made from acetaldehyde, propionaldehyde or butyraldehyde by condensing with a primary or secondary alkyl- or aralkylamine.

SIGNALING CABLE. J. Engler and Ernst Studt (to Norddeutsche Seekabelwerke A.-G.). U. S. 2,101,386, Dec. 7. An oil-insulated submarine signaling cable has the oil enclosed in a thermoplastic insulating jacket, spaced from the conductor by a winding of polystyrene resin.

DENTURE BLANK. Frazier Groff (to Union Carbide and Carbon Corp.). U. S. 2,101,431, Dec. 7. A denture blank is formed from a compressed synthetic resin molding composition, adapted for maximum flow of the material during molding.

ASBESTOS PRODUCT. Robt. E. Parry (to Johns-Manville Corp.). U. S. 2,101,449, Dec. 7. A fireproof impregnated fabric is made of asbestos and the impregnating composition includes a flame-resisting chlorinated vinyl resin and chlorinated rubber.

PATTERNS IN COLOR. Kurt Gullich (to Bisonit G. m. b. H.). U. S. 2,101,540, Dec. 7. Molded articles having a varicolored pattern which extends throughout the body of the material are made by compressing successive layers, each different in color, of a thermoplastic united under heat and pressure, then sliced to reveal the color pattern.

HYDROCARBON RESIN. Thos. F. Nealon (to Monsanto Chemical Co.). U. S. 2,101,558, Dec. 7. In polymerizing petroleum unsaturates (cracked distillates) over a metal halide catalyst the spent catalyst is destroyed with excess alkali to facilitate recovery of the resin from the reaction mixture.

ZINC COATING. J. A. Henricks (to Udylite Co.). U. S. 2,101,580-1, Dec. 7. Use of soluble urea-formaldehyde or ammonium thiocyanate-formaldehyde resins in cyanide plating baths for producing bright zinc coatings.

DRYING RESINS. H. L. Bender (to Bakelite Corp.) U. S. 2,101,635, Dec. 7. Aqueous systems containing heat-hardenable synthetic resins are dewatered by a hot spray drying method which avoids such heat conditions as would harden the resin.

MOLDING COMPOSITION. E. Elbel and F. Seebach (to Bakelite Corp.). U. S. 2,101,642, Dec. 7. A phenolic resin, made with hexamethylenetetramine and hardenable by heat, is molded without liberation of free ammonia by partially esterifying the resin with an organic acid anhydride or chloride and molding in a hot press.

ALKALIPROOF VARNISH. C. Ellis (Ellis-Foster Co.). U. S. 2,101,792, Dec. 7. A varnish with improved alkali resistance contains an alkyd resin modified with gelled fatty oil acids and compounded with ester gum.

WRAPPER FOIL. Clyde Scott. U. S. 2,101,876, Dec. 14. A water repellent, moistureproof wrapper foil with a heat-and-pressure sensitive adhesive face is made by a casting method by pouring on the casting surface first a cellulose ester solution to leave a film, then covering with a thin layer of a thermoplastic adhesive.

SOLUBLE RESIN. Herbert Hönel (to Helmuth Reichhold, Reichhold Chemicals). U. S. 2,101,944, Dec. 14. Making a solid, heat-hardenable soluble resin by alkaline condensation of an ethylphenol with excess formaldehyde.

VARNISH RESIN. F. Lauter (to Sealkote Corp.). U. S. 2,101,948, Dec. 14. An alkyd resin which is compatible with cellulose acetate in water-white lacquers is made by condensing phthalic acid with glycerol in presence of lactic acid in catalytic proportions.

CELLULOSE ACETATE. F. R. Conklin and C. L. Fletcher (to Eastman Kodak Co.). U. S. 2,101,984, Dec. 14. Cellulose acetate is prepared in suitable condition for molding by warming it with 2% or less of sulphuric acid while still in the acetic acid solution.

LACQUER. C. Ellis (to Ellis-Foster Co.). U. S. 2,102,114, Dec. 14. Dissolving urea resins in organic solvents for use in lacquers.

VARNISH RESIN. J. B. Rust (to Ellis-Foster Co.). U. S. 2,102,130, Dec. 14. A fusible acid-condensed phenol-aldehyde resin is solubilized in drying oil by heating with successive portions of drying oil until the initially insoluble resin becomes soluble therein.

RESINS. H. Hopff and F. Schmidt (to I. G. Farbenindustrie A.-G.). U. S. 2,102,179, Dec. 14. Interpolymerization of styrene with acrylonitrile or methacrylonitrile.

COATED PAPER. J. K. Hunt and G. H. Latham (to E. I. du Pont de Nemours and Co.). U. S. 2,102,207, Dec. 14. Greaseproof, moistureproof wrapping material is made by coating paper with a cellulose mixed ether in which one ether radical is derived from methanol or ethanol and the other from a long chain alcohol (octanol or higher).

BLENDED RESINS. J. D. Farber (to Management and Research, Inc.). U. S. 2,102,617, Dec. 21. Condensing phenol with formaldehyde and oxalic acid and blending while still hot with a newly made alkyd resin prepared from citric acid, glycerol and phthalic anhydride.

ARTIFICIAL LEATHER. H. J. Jenemann (to E. I. du Pont de Nemours and Co.). U. S. 2,102,715, Dec. 21. Coating fabric with plasticized nitrocellulose, printing in a photographically reproduced leather design in nitrocellulose ink, embossing in leather grain and coating with a clear nitrocellulose lacquer.

ALKYD RESIN. H. O. Albrecht, R. A. McGlone and S. J. Roskosky (to E. I. du Pont de Nemours and Co.). U. S. 2,103,238, Dec. 28. Alkyd resins made in presence of at least 0.002% of a copper catalyst have a low acid number, not more than half that of a resin made in the absence of the copper catalyst.

OIL-SOLUBLE RESIN. Israel Rosenblum. U. S. 2,103,273, Dec. 28. An oil-soluble alkyd resin is made from glycerol, maleic acid, a lower aliphatic acid (formic to valeric) and an oil acid.

# FOREIGN PLASTICS PATENTS

**Application dates are given for patents of European countries, but for Canada the issue date is given**

CELLULOSE ETHERS. L. Lilienfeld. Brit. 469,007, Oct. 11, 1935. Plastics, coatings, adhesives and sizes are made from cellulose ethers by dissolving or suspending them in aqueous alkali and blending with cellulose xanthate.

ARTIFICIAL LEATHER. Dynamit-A.-G. vormals A. Nobel und Co. Brit. 469,090, Oct. 10, 1935. Polyvinyl resins are produced in thin layers or films, for use in making artificial leather, by hot rolling or hot plate pressing, or by slicing from a block or by forming an emulsion coating.

VINYL POLYMERS. W. W. Groves (to Deutsche Celluloid-Fabrik). Brit. 469,249, Jan. 22, 1936. Plastics for sound records, photographic film supports, safety glass interlayers, rods, tubes, toys and ornaments are made by interpolymerization of a vinyl compound (vinyl chloride, chlorinated vinyl chloride, styrene or the like) with an acrylic acid ester in presence of a solvent which can be converted into a non-solvent.

TREE SURGERY. H. L. Gerhart (to Standard Oil Co. of Indiana). Can. 369,663, Nov. 2, 1937. Use of polymerized isobutylene as a flexible, elastic, biologically inert resin in tree surgery.

PLASTIC. A. Weihe (to Deutsche Celluloid-Fabrik). Can. 369,642, Nov. 2, 1937. A plastic comprising a polymer of pure phenylvinyl ketone and benzylnaphthalene in an organic solvent.

PLASTICIZERS. I. G. Farbenindustrie A.-G. French 813,551, Nov. 16, 1936. The phosphates of high-boiling alcohols (boiling point range 100–190°C.) from the catalytic hydrogenation of carbon monoxide and carbon dioxide are useful as plasticizers in cellulose acetate, nitrocellulose, benzylcellulose or vinyl resin lacquers for wood or metal or for impregnating fabrics.

INSULATING PLATES. Société pour la Fabrication d'Isolants et Revetements Ligneux Isorel. French 812,948, Jan. 27, 1936. Plates are formed from a cresol-formaldehyde resin, covered with a cellulose derivative or vinyl resin foil and molded in a hot press. The foil may be printed in a design, such as wood graining.

METHACRYLATE RESIN. P. H. Hull (to Imperial Chemical Industries, Ltd.). Brit. 469,564, Jan. 27, 1936. Prevention of bubble formation in making clear methacrylate polymers is effected by molding in a vertical mold made of polished metal plates and heated by a hot gas under pressure, progressively upward so that the upper part is never hotter than the lower part.

ADHESIVE TAPE. I. G. Farbenindustrie A.-G. French 814,643, Dec. 1, 1936. Adhesive tape with cotton, silk, jute, leather, paper or cellulosic foil backing has an adhesive face of vinyl ether resin which may be plasticized, pigmented or blended with other resins.

TELEVISION CABLE. Allgemeine Elektricitäts-Gesellschaft. French 814,675, Dec. 7, 1936. In an air-insulated television cable the conductor is surrounded by an insulating support made of a synthetic resin with low dielectric loss, e. g., a vinyl chloride, vinyl acetate or acrylic acid resin or polystyrene.

FLAMEPROOF PENCILS. Friedrich Büchner. Ger. 643,084, May 5, 1933. An incombustible molding composition for making slate pencils and like articles contains slate dust with a water glass and cold water glue binder, with or without a plasticizer such as rapeseed oil. Asbestos or woodflour may be added to the slate dust.

PACKING RINGS. Gustav Huhn. Ger. 648,188, Nov. 26, 1933. Contact packing rings for steam turbine shafts are made by filling annular grooves in the housing with a paste of charcoal, graphite and liquid synthetic resin, and solidifying by heat.

POLYSULPHIDE PLASTICS. R. Eyssen (to Morgan Crucible Co., Ltd.). Brit. 470,014, Feb. 6, 1936. Compositions for making molded bearings, washers and other mechanical goods are made by polymerizing olefin polysulphides and compounding the products with pigments, inorganic fillers, fibrous fillers or the like.

ALKYD RESINS. S. Bakonyi. Brit. 470,038, July 20, 1936. Resins of the alkyd type which are compatible with nitrocellulose or cellulose acetate in lacquers, molding compositions and adhesives are made by condensing citric, adipic or sebacic acid with ethylene glycol, triethylene glycol, butylene glycol, octadecanediol or glycerol and fusing with urea, then condensing with an aldehyde.

SAFETY GLASS. W. Konigswarter and L. Fejes (to Elektro-Osmose Graf Schwerin Gesellschaft). Brit. 470,135, July 14, 1936. Polyvinyl acetate for safety glass interlayers is plasticized with at least one solvent boiling between 100° and 200°C., e. g., diacetone alcohol, methylcyclohexanone, methylglycol acetate or the like.

INSULATION CEMENT. British Thomson-Houston Co., Ltd. Brit. 470,244, March 23, 1937. Polyacrylic acid esters, e. g., polymerized ethyl acrylate, may be compounded with lithopone or a like filler (in the proportion of 70% filler, 30% polymer) to make cements for joining fiber insulation to electrical conductors.

NACREOUS PLASTICS. J. Malet and P. Devenny (to Société Fabriques de Chimie Organique de Laire). French 812,954, Jan. 27, 1936. Plastic compositions with the appearance of mother-of-pearl are made by adding phenanthrene, fluorene, anthracene or carbazole (dissolved in a phenol) to an initial urea-formaldehyde condensation product, and completing the condensation.

ABRASIVES. Carborundum Co. French 815,704, Dec. 29, 1936. Water-soluble vinyl resins are used in binder compositions for abrasive disks which can be molded in the cold; among the suitable resins are polyvinyl alcohol, partially hydrolyzed polyvinyl esters, partial vinyl esters of dibasic acids, and the reaction products of polyvinyl alcohol with alkylene oxides.

TRACING CLOTH. Paul König. French 811,770, Oct. 8, 1936. A nitrocellulose composition for coating fabric to make tracing cloth contains 1 liter each of nitrocellulose and acetone, to which are added 30 grams powdered pumice and 20 grams whiting.

SHELLAC SUBSTITUTE. G. W. Johnson (to I. G. Farbenindustrie A.-G.). Brit. 470,280, Feb. 20, 1936. Resins which may be used instead of shellac in polishes, coatings, electrical insulation, sound records and the like are made by condensing acetaldehyde, propionaldehyde or butyraldehyde with small amounts of primary or secondary amines in presence of weak acid condensing agents.

# NEWS

EDGAR M. QUEENY, PRESIDENT OF MONSANTO Chemical Co., announced that all the assets of The Fiberloid Corp., of Springfield, Mass., have been acquired by Monsanto in exchange for capital stock on the basis of seven shares of Monsanto Chemical Co. for twelve shares of The Fiberloid Corp.

The Fiberloid Corp., which was established in 1892, is one of the nation's leading producers of plastics. Its products include cast phenolic resins, cellulose nitrate and cellulose acetate. The company, in partnership with the Shawinigan Chemical Corp. of Montreal is now engaged in erecting a large plant at Springfield for the production of plastics of the vinyl acetate type.

Fiberloid's stockholders are expected to ratify the sale at their meeting to be held February 16 and it is anticipated that John C. Brooks, president of The Fiberloid Corp., will become vice president and director of Monsanto Chemical Co. No change in personnel, methods of operation or policies of The Fiberloid Corp. are contemplated by Monsanto Chemical Co.

AUBURN BUTTON WORKS, Inc.'s New York Office has recently moved to new and larger quarters at 15 East 26th Street.

THE WATSON-STILLMAN CO. HAS TRANSFERRED its district sales office from Columbus to Detroit. J. C. Grindlay, western sales manager, will be in charge of the new office which is located in the Book Building.

THE REVOLITE CORP. HAS CHANGED ITS NAME to the Industrial Tape Corp. with no change in location or personnel.

CELLULOID CORPORATION ANNOUNCES THE opening of its new and enlarged sales offices in the Merchandise Mart, Chicago, to take care of its expanding business in the middle west. Fifty percent additional space has been leased. W. K. Woodruff is middle west district manager.

The company also announces the opening of a new sales office at Worcester, Massachusetts, in order to better serve the customers of its several divisions in the New England states. R. S. Gavitt is appointed New England district manager.

BAKELITE CORPORATION FEATURED IN THEIR display at the recent Advancement of Science Exposition the processing of a wide variety of plastic materials for countless industrial applications. A specially prepared panel clearly indicated the steps involved in converting primary materials into finished products. Included in these primary materials were: molding compounds; laminated sheets, tube and rod products; cast resinoids; coating, bonding and impregnating materials; special resinoids for bonding abrasive wheels, plywoods and veneers; calendering materials for waterproofing textiles; resinoids for dental restorations; and a host of other products. Supplementing this central display were special exhibits demonstrating the important properties inherent in plastics—chemical resistance, impact resistance, heat resistance, and insulation with special low-loss characteristics.

N. S. STODDARD HAS BEEN APPOINTED ADVERtising manager of the plastics department of the General Electric Co. by C. H. Lang, manager of the Company's advertising and publicity department. Mr. Stoddard, a graduate of Choate School, class of '26, has been with the General Electric Co. since 1931 when he entered the publicity department. Later in the same year he was transferred to Lynn, Mass., to handle advertising and sales promotion for the plastics department.

After a brief period in the plastics plant at Meriden, Conn., he returned to Lynn where he spent the next five years. In 1936, Mr. Stoddard went to Pittsfield and when the plastics department was affiliated with the appliance and merchandise department, his headquarters were changed to Bridgeport, Conn. With the consolidation of commercial and administrative offices to the new G. E. molding plant Mr. Stoddard was transferred to the Plastics Department at Pittsfield, Mass.

MEL KORDENBROCK, FORMERLY WITH LODGE & Shipley Machine Tool Co. and Sterling-French Machinery Co., announces the opening of the Kordenbrock Machinery Co., with offices at 2842 E. Grand Blvd., Detroit, and representing Reed-Prentice Corp. on plastic injection molding machines.

TIMED TO COINCIDE WITH THE BEGINNING OF peak buying seasons in mass production industries, for machinery, tools, production equipment and materials,

# NEWS

a Machine and Tool Progress Show, national in character, is scheduled to open at Convention Hall, Detroit, March 9th. The Show is sponsored by the American Society of Tool Engineers in connection with its first annual convention. From present indications, it should represent one of the widest ranges of industrial equipment, ever assembled. Plastics and plastic production equipment as well as metal spraying equipment are included in the show.

THE SCHOOL OF ARCHITECTURE OF THE MASSAchusetts Institute of Technology scheduled a lecture on "Modern Plastics" by Dr. G. M. Kline on January 5. The various types of plastics, methods used in fabricating them and their applications were reviewed by the speaker. The lecture was illustrated with some 25 slides, which dealt particularly with the architectural uses of the laminated plastics.

ERICH RATHJE OF THE HEYDEN CHEMICAL Corporation returned recently from a three months' combined business and pleasure trip to Europe.

REYNOLDS MOLDED PLASTICS DIVISION OF Reynolds Spring Co., Jackson, Michigan, announces the opening of district sales offices at 80 E. Jackson Blvd., Chicago; 1836 Euclid Ave., Cleveland; and 414 Fisher Bldg., Detroit. Robert W. Ward is in charge of the Chicago office while W. L. Yeager and Donald Lyons manage the Cleveland and Detroit offices, respectively.

MICA INSULATOR COMPANY ANNOUNCES THE appointment of the Kirby Company, 13000 Athens Avenue, Cleveland, Ohio, as authorized fabricator of Lamicoid, a laminated phenolic material available in sheets, tubes and rods.

THE INDUSTRIAL CHEMISTS AND THE PLASTICS manufacturers, who have never taken any prominent role in previous American expositions, will occupy an entire section of the New York World's Fair of 1939, Grover A. Whalen, president, disclosed recently. Not only has E. I. du Pont de Nemours & Company, Inc., taken a plot of 36,222 square feet upon which to erect a display building, but the Fair Corporation itself schedules a $200,000 Chemicals and Plastics Building.

Mr. Whalen disclosed that space is already going to business concerns interested in "surprising millions of visitors" with displays of synthetic or entirely new products created through chemistry and the plastics industry.

J. H. DuBOIS, FORMERLY WITH THE GORHAM Silver Company has joined the General Electric Company as Plastics Specialist. Mr. DuBois' headquarters will be in Chicago and he will serve General Electric Textolite customers in the mid-western territory.

THE PLASTICS PROPERTIES CHARTS WHICH WERE included in the October 1937 issue of MODERN PLASTICS have been reprinted and are still available at 50c each to those interested in securing copies.

STUDIES IN WOOD, PAPER, STONE, METAL, AND synthetics to acquaint students with problems in the field of industrial design have been organized in the Art Schools of Cooper Union. Experimental projects in basic modern materials are being carried out under Paul Feeley, recently named director of the Union's reorganized Department of Plastic Design.

MORRIS BARCHARD HAS BEEN APPOINTED sales manager of the plastic molded division of The General Industries Company, which promotion is in recognition of the fine work he has done in this division over a period of years.

WINDMAN BROTHERS, PLASTIC MOLDERS, HAVE removed their business to a new plant at 3325 Union Pacific Ave., Los Angeles, Calif.

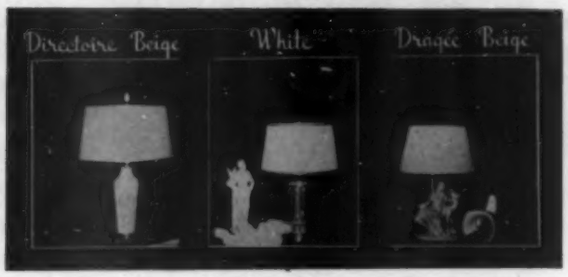
BARNEGAT PETE, PET DEER WHO RAN INTO Barnegat, N. J., three years ago to escape a forest fire, is dressed in a red checked coat and red and white Catalin necklace so that he will not be shot during the hunting season. The necklace holds a white Catalin plaque on which is engraved, "This is Barnegat Pete—Barnegat, N. J., children's pet—Don't Shoot!" Pete sleeps in a bed every night above a local store, romps with the

children and dogs, has carte blanche at the village vegetable and confectionery stores, often simulates Mary's little lamb by following the children into their class rooms. He often runs off into the woods but returns at meal time. Pete is dressed at this time of the year so that hunters will recognize him. Pete, by the way, has grown his first horns this year.

# NEWS

THE NEW YORK LAMP SHOW WAS HELD DURING the week of January 17th at the Hotel New Yorker under the George F. Little Management.

Celluloid Corporation was the only plastic material supplier who exhibited this year. The accompanying illustration shows the side panel of their room in which against a background of black, each lamp was shown in a shadow box. A Directoire Beige shade was on a Directoire lamp of white and gold china with a richly engraved gold finished stand. Costume jewelry of that period and accessories were also shown.




The next niche had a white Lumarith shade on a Wedgewood lamp, snowy chiffon kerchief and white porcelain statue of a woman holding skiis. "Dragée" Beige Clair de Lune shade on a tawny clay figure of woman and stag lighted the next box and a horn of plenty emitting dragée chocolates completed the picture.

The other new colors which the company believes will be popular during 1938 are Wheat, Shantung, Champagne Pistachio, Crystal and Cafe au Lait.

THE 1938 REGIONAL MEETING OF THE AMERIcan Society for Testing Materials will be held in Rochester, N. Y., on March 9th. The technical feature of the program will be a Symposium on Plastics to be sponsored by Committee D-20 under the chairmanship of Mr. W. E. Emley, chief, Division of Organic and Fibrous Materials, National Bureau of Standards. The titles and authors of the papers to be presented are:

"A discussion of the testing methods for the determination and comparison of the strength properties of organic plastics," by H. M. Richardson, General Electric Company.

"A review of the thermal properties of plastics and the methods for measuring them," by W. A. Zinzow, Bakelite Corporation.

"Flow relations of thermal plastic materials," by C. H. Penning and L. W. Meyer, Tennessee Eastman Corporation.

"Permanence of plastics," by G. M. Kline, National Bureau of Standards.

"The properties of an ideal plastic," by A. F. Randolph, E. I. du Pont de Nemours & Company.

"Hardness as applied in the plastic industry," by J. C. Pitzer, Formica Insulation Company.

# PUBLICATIONS

**Booklets reviewed in these columns will be sent without charge to executives who write for them on their company letterheads. Other books will be sent postpaid at the publishers' advertised prices**

GENERAL PLASTICS, INC., HAS PUBLISHED A twelve page booklet showing the important part that plastics are playing in radio manufacture. More than twenty table model radios are illustrated and described.

A FOUR PAGE FOLDER PUBLISHED BY ILLINOIS Testing Laboratories, Inc., describes their surface temperature pyrometers and calls attention particularly to the semi-swivel self-aligning tip used on pyrometers.

TWO BULLETINS, ONE DESCRIBING MIXERS, THE other centrifugal pumps have been issued by the Abbe Engineering Co. and their associate the Beach-Russ Company, respectively.

A REVISED EDITION OF SCHEDULE B, THE Statistical Classification of Domestic Commodities Exported from the United States, which became effective January 1st, is available from the U. S. Department of Commerce. Regulations Governing Statistical Returns of Exports of Domestic Commodities has also been recently released.

A SMALL BOOKLET ON "MODERN CLOSURES FOR Modern Packages" was recently issued by Armstrong Cork Products Co.'s closure division. The folder annouces the Eighth Packaging Exposition to be held in Chicago and urges the attendance of all readers. Various packages and their harmonious closures are illustrated.

AN EIGHT PAGE FOLDER, REPRINTS FOR THOSE interested Lammot du Pont's speech on "Industry's Outlook" delivered before The Congress of American Industry on Dec. 7th. Mr. du Pont is president of E. I. du Pont de Nemours & Co., Inc.

AN IMPROVED MACHINE FOR THE PRODUCTION of small intricate dies and molds is presented in an eight page bulletin published by the George Gorton Machine Company.

THE NEW QUARTERLY PRICE LIST OF R & H Chemicals has just been issued by this division of E. I. du Pont de Nemours & Co., Inc.

THE DEVELOPMENT AND ADVANTAGES OF THE centrifugal type of water-vapor refrigeration as well as typical installations are presented in a new 32 page booklet issued by Ingersoll-Rand.

Using water as the only refrigerant and providing operating characteristics such as sustained capacity, self regulation and high reserve capacity, these refrigerating units are claimed to be excellent in cooling water for air conditioning and a variety of applications in industrial and chemical plants. The units can be economically driven by electric motor or steam turbine.

THE FRENCH OIL MILL MACHINERY CO.'S HYdraulic press division has recently published a 20 page booklet on "Modern Hydraulic Presses." Many of the company's presses for extruding and molding all sorts of materials and press controls are illustrated and described.

HERMAN A. HOLZ, MANUFACTURER OF TESTing machines, offers a bulletin describing and illustrating the various methods of hardness testing of metals and plastics with references to the Amsler-Vickers machine.

THE NEVILLE COMPANY HAS PUBLISHED A NEW folder which is a condensed listing of their coal-tar products giving uses and pertinent data in concise forms under the headings: synthetic resins, solvents, plasticizing oils, oils and tar products.

TECHNICAL DATA BULLETINS HAVE BEEN REcently published by the Haveg Corporation on each of its standard types of equipment; such as piping and fittings; rectangular tanks; cylindrical tanks; and towers.

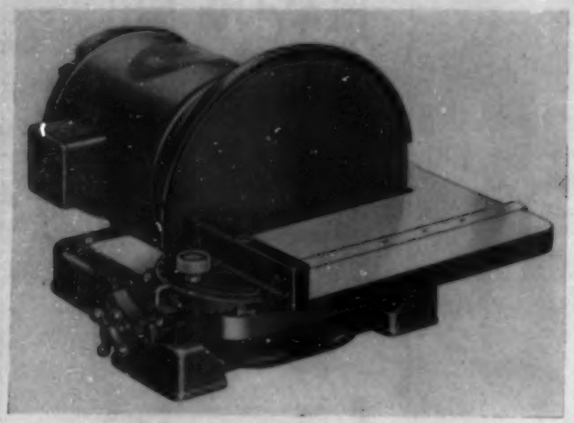
A NEW MONTHLY PUBLICATION DEALING WITH stress, polarized light, and plastics has been published by Polarized Light Co. beginning with the January issue. Arshag G. Solakian, lecturer at Columbia University, is editing it.

THE STANDARD MACHINERY COMPANY HAS issued a four page, illustrated folder describing their molding presses. The new folder, in explaining the advantages of the Standard Self-Contained Molding Presses, features improvements recently made that increase the production and adaptability of the presses in all kinds of work. The mechanical operation, the efficiency and economy of operation, and the low cost of installing and maintaining the Standard Presses is also described.

CONTINUING EMPHASIS ON INDUSTRIAL RELAtions problems and the development of sound personnel policies has prompted many companies to look more closely to the organization of their personnel departments. They are doing this with the realization that improper organization of the personnel function seriously handicaps the development and execution of an effectual personnel program. In view of the widespread interest in this problem, the Policyholders Service Bureau of the Metropolitan Life Insurance Company has recently issued a report entitled "Functions of the Personnel Director," which is based on information obtained from 80 companies in a wide variety of fields.

VOL. 1, NO. 1 OF A NEW PUBLICATION "THE Neoprene Notebook" has been issued by the Rubber Chemicals Division of E. I. du Pont de Nemours & Co.

# EQUIPMENT



DESIGNED FOR A WIDE RANGE OF CUTTING operations, a new metal cutting band saw recently announced by the Delta Manufacturing Company is said to be one of the most useful tools for the all-around shop. The band saw is of 14 in. capacity, and will cut materials up to 6 in. thick. With an extension attachment the capacity under the guide can be increased to 12 in. when necessary. The saw has five speeds; four for metal, of 125, 175, 250 and 340 feet per minute, and one for wood of 2200 feet per minute. The slow speeds are obtained through a ball-bearing gear box, and the wood speed is obtained direct from the motor by a V-belt drive. Change from low to high speed is accomplished simply and easily. The machine is ball-bearing throughout, new departure self-sealed bearings being used to eliminate the necessity of lubrication.

The machine can be used for cutting templates, for experimental work, for sheet-metal sawing, sawing jig and fixture bases and similar parts, fitting light structural sections and extruded shapes, trimming gates in iron, brass and aluminum, sawing plastics and for many similar purposes and other materials.

SYNTRON COMPANY RECOGNIZING THE EVER-growing demand for modern labor-saving electric tool equipment, has brought out a complete new line of portable electric drills, the leader of which in value is probably the $1/2$ in. capacity Model No. 12-S. Sturdy cross bar handles, together with an end spade handle, provide easy operation. The aluminum shell houses a powerful universal electric motor. The reduction gears are all of heat-treated chrome molybdenum steel, ball-bearing mounted. The three-jaw geared Jacobs chuck accommodates up to $1/2$ inch straight shank drill bits.

A NEW 9 IN. SWING LATHE WITH A $1\ 3/8$ IN. HOLE through the spindle and 1 in. collet capacity is announced by the South Bend Lathe Works. This lathe is back-geared, and screw-cutting with all engine lathe features, and has been developed especially for the manufacturing plant and the tool room.

B. M. ROOT COMPANY, MANUFACTURERS OF multiple boring machines make a multiple spindle borer which looks as though it might be extremely useful in the plastics industry. It is designed primarily for speed production of wood and light metal but it appears to have advantages worth investigating by molders and fabricators of plastic material. A folder which describes and illustrates the machine is available.

A SMALL SIZE WHEELABRATOR TABLAST DEsigned for cleaning small parts is marketed by The American Foundry Equipment Company. It consists of a number of independent tables, the number and diameter of which can be varied. These tables are mounted on a spider which carries them directly under the blast zone. A motor-driven steel disk contacts the tables, rotating them eight times to each foot of travel. All work being cleaned is fully exposed to the blast, as the tables carrying the work turn constantly while in the blasting zone.

TO MEET THE DEMAND FOR HIGH-SPEED CONtrol and indicating equipment for industrial proportioning, The Howe Scale Co. offers a new ultra-sensitive, electric cut-off attachment, which can be used with any dial scale and can be adjusted to open or shut hoppers, batching equipment, control valves and other units connected with the operation of weighing materials.

A PRESS FOR MOLDING AUTOMOTIVE BRAKE blocks has been built by Farrel-Birmingham Co. Inc. The press is self-contained, individually powered, with a motor-driven pump mounted on top. It has a maximum capacity of 500 tons with one down-acting 21 in. diameter ram and two $6\ 1/8$ in. double-acting cylinders mounted in the top crosshead and working under an initial pressure of 2600 lbs. per square inch.

THE MINNEAPOLIS-HONEYWELL LO-WATER Cut-off is now available at a new low price, yet it has many new and vital features which include quick installation, flexible mounting, alarm or signal circuit, easily accessible, improved mercury switch. Boiler protection is essential for steam and vapor systems. This new low pressure cut-off can be installed according to the ASME boiler code—or in the gage glass fittings of the boiler with the resulting saving in labor and material. It is designed to fit standard half inch gage glass openings. An unusual installation feature of this Lo-Water Cut-off is that the lower fitting may be readily removed if there is not enough room to swing the entire assembly. A copper tube between mountings can be cut to accommodate various center dimensions and easily shaped to allow for any slight misalignment. The switching mechanism may be removed, without dismounting the instrument from the boiler. Designed for use with pressures not exceeding ten pounds per square inch; the electrical rating is 10 amps. at 110 volts and 5 amps. at 220 volts with motor rating of $3/4$ H.P.R.I. and $1/4$ H.P.S.P. A manual reset is also obtainable at slight additional cost to restore burner operation.

# LUMINOUS PLASTICS

*(Abstracted from Vol. I, No. 5, "Plastics," England)*

"Apparently luminous plastics are produced somewhat after the manner we have described, that is, by the incorporation of certain sulphur compounds, such as barium or calcium sulphides of extreme purity, with, say, cellulose acetate powder, from which mouldings and sheets are prepared. The sulphides under the action of light undergo a curious chemical change in which energy in the form of light is given out again. This light, which is not an ordinary white light but of a wavelength depending on the constituent metal (e.g., barium) that is used, is easily visible in the dark. The manufacturers claim that the goods moulded from luminous plastic powders are able to retain their luminosity for over 80 hours, after which time the material must be reactivated by exposure to sunlight or electric light before it can again be visible in the dark.

"Now, although one can visualize many uses of luminous plastics, it comes as a shock to find the really great possibilities of these new materials and, moreover, to find that in this country they are scarcely known. What is more important, they are extensively used in France, not merely as a rather clever form of amusing decoration, but in industry.

"Broadly speaking, in industry, the use is obviously of value where machinery, through some more or less temporary stoppage in the lighting system, must continue working. An electricity station is an obvious example, where indicators, switch-gear handles, control levers, or even telephones, must be easily attainable in darkness. Similarly, in most works, where important pressure or level gauges, important exit doors, dials, and so on, are under constant supervision. It must be remembered that lighting fails not merely because of breakdown at the electricity station. It may also fail through fuses (and all fuse boxes should be made of luminous plastics) or fire. And today, unfortunately we must be prepared for the cessation of light through air-raid precautions.

"We are informed, too, that almost every French battleship and submarine is provided with luminous plastics. In the naval world it often happens that, even on manoeuvres, all lights are extinguished, so that sighting rods, control handles and indicators of many descriptions are made of or provided with some form of luminous material. Within gun turrets (for electric-light bulbs break with concussion) luminous breech block handles and breech-opening indicators are provided.

"To turn to more normal things, some of the suggested applications and those in actual use are extremely interesting. There are electric-light, wall and hanging switches, fuse boxes, bell-pushers, keyhole plates for the night wanderer; and for the invalid, tumbler holders, feeding-bottle stands or vacuum-flask holders.

"For automobiles, we may yet see dashboard instrument dials to eliminate the interior lighting system, brake-lever handles or auxiliary rear lights. For railways are suggested 'corridor' signs, station name boards and tunnel and bridge 'corner' signs. On ships, directional arrows in gangways, hand-rail and stair indicators, telegraph dials and edge outline of lifeboats are obvious applications."

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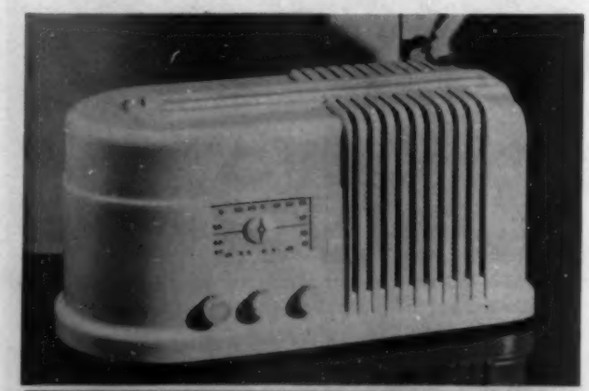
# LET'S LOOK AT RADIO CABINETS

*(Continued from page 23)* certain plastics react under varied molding conditions. He is the doctor who will base his analysis on the symptoms shown in the design, and on his past experience.

Plastics have long been burdened with the word "unbreakable." Even casual analysis of this word will disclose the error. Plastics are frequently shatterproof and highly shock resistant, but "unbreakable" is a bit strong. Often this misnomer has resulted in careless handling; savings are attempted in packaging and shipping which result in disaster. Plastic housings will withstand considerable abuse, but they will not bounce.

Perhaps the best answer to this question is to point out the evident satisfaction of those companies which have pioneered this use for synthetic materials. The Pilot Radio Corporation, engaged chiefly in *export trade* has three cabinets, one of which is the largest single piece molded housing in the country. The Emerson Radio and Phonograph Company has placed on the market over the last two years, four models in various

Top photo: Silvertone set molded of Beetle by American Insulator Corp. for Sears Roebuck. Designed by John R. Morgan. Below, molded in 3 parts, this Emerson cabinet of Bakelite and Beetle may be made in many combinations of color, and design can be readily changed on any section



Small Crosley set designed by Sundberg & Ferar, molded by Chicago Molded Products Corp.

sizes and price ranges. Outstanding radio manufacturers such as Belmont, Fada, Remler, Majestic and the United-American Bosch Corporation have developed beautiful and luxurious looking models; certainly this bespeaks the satisfaction of both the consumer and manufacturer.

Do not look on the development of this housing market as an overnight occurrence or one that is bound to live a short rapid life and pass away. The evolutionary process has been slow and those market applications wherein plastics were first used in the form of a housing are still consuming a large share of the annual tonnage sold. We have only to look at the present day electric clocks, the electric shavers, telegraph call boxes, scale housings, etc., to see the truth of this argument.

There may be no news to the great success shown by these materials over such a wide market, but there's an awful lot to boast about.

## MOLD COSTS AND PIECE PRICES

(*Continued from page 27*) asks for prices on a single cavity die. In response to this inquiry he, of course, gets various quotations varying from single to fifty cavity capacities. It is now Mr. Jones' problem to select not only the most economical mold but also the one which will give him the greatest saving in the long run. With this in mind he assumes that a million parts will be the basis for mold longevity and proceeds to make up the chart on page 27, using the lowest figures received from all the reputable molding concerns submitting quotations.

The first four columns he records from the figures as submitted and the other information he prepares on the basis of producing a million parts. Column number six takes into consideration an alternate interest bearing investment on a pro rata basis which he rightfully concludes must be added to the original mold cost in order to gain a fair comparison. The next column gives the total expenditure required for the production of one million parts, the number of months necessary to produce that quantity being figured in column five. By dividing the total expenditure column by one thousand, the mean cost per thousand is obtained as is shown in the last column. In this particular instance it can be deduced that the lowest unit cost is to be obtained by purchasing the ten cavity mold, and upon checking the annual production that such a mold could attain, it is further recognized as the most efficient set-up from every angle. So by spending a small amount of time in segregating pertinent information Mr. Jones was able to save his company hundreds of dollars in the purchase of the mold, besides getting the production he required.

From the example given it becomes evident that other sliding scale quotations could be similarly analyzed. On the assumption that one million is the number of parts needed in the long run, and also that that quantity is approximately the expectancy from the initial mold investment, the most economical mold to use can be ascertained by means of comparison of figures. Only one other factor must be assumed to be reasonable, that being the rate of interest on the principle or mold investment. On the large scale method as outlined we find that the mold cost plus its interest on a per annum basis offsets the total piece price for a large quantity run, and that it is the differences in cost between these two opposing sets of figures which determine economical die capacity.

## LAMINATED SURFACE DESIGN

(*Continued from page 38*) cut to the desired length was pressed into the track to finish the assembled wall and to protect against moisture.

The color scheme in Bath No. 1 is ebony-black, soft grey, and off white. Soft grey walls and ceiling, black accessory cabinets with built-in lavatory, diffused lighting and additional side lighting for the round mirror are distinctive features. The cabinets are enhanced by their coral plastic-lined interiors. Other features are: Stocking or lingerie drying and heating cabinet in gleaming black, built-in tub and shower with hand-rails and overhead infra-red warming lamp, and a white, grey, black-banded dado about three feet high. A flush solid white plastic door balances the white window and bath curtains, porcelain fixtures and white wall area over tub. A black cabinet, counter height, connects the built-in tub wall and front wall near door to furnish shelf space and laundry chute. (The laundry chute can also be entered from the hall outside.) Black panels flank the head and foot walls of the tub and the ceiling overhead, further repeating the color note of the cabinets around the lavatory. A flush mounted clock face of laminated plastic (no glass) with inlaid colored aluminum dial is mounted on the window-wall. Counter-sunk ceiling lights (one shown in photo, other over bath) and two-tone cork-floor with bath rug complete the design features of this bathroom.

Bath No. 2 is most notable for its colorful over-bath mural (nude figures approximately four feet high) made by inlaying dyed aluminum and colored surface papers in a single laminated sheet 4 ft. wide by $7\frac{1}{2}$ ft. in height. The mural design was conditioned by the need of separating each plastic color with an aluminum strip to prevent color-bleeding or spill-over. The plastic paper colors in the mural of grey-green, ebony-black, dove-grey,

chocolate-brown, coral and ultra marine blue are beautifully foiled by the aluminum inlay figures of brushed silver, brassy-yellow, rich tones of deep reddish-brown and vermillion.

The splash panel design at head of tub complements the border motif of the mural by bringing the black around and down to the tub again. The ebony-black laminated built around the tub houses a low round-cornered utility cabinet at the foot which provides convenient storage for bathroom necessities. The cabinet interior has black shelves and coral-colored walls. The high dado around the room, the two flush-type doors, the top of the tub-cabinet, and the built-in lavatory cabinets shown in the photographs are made of a soft grey-green laminated urea. Cabinet shelving and base-board trim (part of wall) repeat the black built-in tub and mural portion areas to unify the room's color scheme. The rest of the walls and ceiling are covered with a lemon-yellow wall covering. All moldings are brushed aluminum and other metal fixtures are chromium-plated. Lavatory lighting as in Bath No. 1 and flush ceiling light unit with the two-toned cork floor are the other characteristics of this bathroom interior treatment.

Laminated phenolics and urea $^1/_{16}$ in. thick were veneered to all edges of the special $^3/_4$ in. plyboard construction and these were then fabricated into the desired cabinet designs. These followed the simplest and most direct methods of cabinet construction not only for functional usefulness but also to express the inherent beauty-qualities of the plastic material used. The doors are quite frankly doors, flush-mounted with simple outside hinges and snap-lock. The edges are covered in contrasting color. The lavatory basins rest on and extend in front of ledges of the cabinets at the proper height thus giving plenty of needed leg and foot room underneath. The stocking dryer cabinet holds a small motor with fan in the base, metal grilles cover the ventilation openings at top and bottom. (Note: Bath interiors, accessories and mural designed and supervised by Sidney G. Warner, executed by the Westinghouse Electric & Mfg. Company.)

## DISPLAYS THAT SURVIVE

(*Continued from page 26*)

Illumination creates many startling and unusual effects when used with plastic displays. The glowing gem-like colors of the translucent and mottled plastics are particularly beautiful when brilliantly lighted. The use of lights to throw cut-out plastic letters into relief is a modern treatment of this idea. The adaptation of such a treatment is shown by Fig. 2 where a mottled ivory cylinder containing a lumiline light was fixed to a wood base. The letters were cut out of transparent material. Figs. 3 and 4 show the successful combination of three-dimension plastic cut-out letters attached to mirrors. In both instances the letters are white plastic on amber mirrors providing exceptional readability.

Plastic resin can be used for the interpretation of color in display designs more effectively than many other products used today. It has the brilliancy and luster of precious stones and the combination of these glowing colors with the clean sweeping lines of a properly designed display, stimulates sales, attracts buyers and offers new channels of distribution. A good display, modern in design and sturdily built can truthfully be called a successful "silent salesman."

## THELMA E. BEAMAN, MOLDER

(*Continued from page 30*) conditions did not help to make this an easy job. Her ability to read blueprints was not particularly helpful in figuring the cubicle contents of an industrial part to be molded of plastics and Mrs. Beaman frankly admits that when she gave her first quotation, she rather hoped she would not get the job because she was not quite sure that the part could be produced at the price she quoted.

Speaking of her experiences in the shop during those first months in which she shouldered all responsibility, she says, "Lathes and drill presses have always fascinated me and on several occasions I have had a chance to operate them, but it was not until August 1936, that I actually operated a molding press.

"For six hours one day, I molded with two one-cavity molds. I was trying to do all the operations I had been telling men to do for the past three years. I learned how much easier it is to direct than actually do the work. After the first hour I was ready to fire myself. Several times I had forgotten to set the time; I took too long to strip loads and change dies in the press. The minutes flew by and the die would be in the press too long curing the piece. I also learned that the heat from the dies goes through gloves quickly and once through it remains.

"After I had molded for about an hour I was quite conscious of that intense heat which makes one feel rather uncomfortable. There is as much difference between the side of the table where I often stand and the other side in front of the press as there is between the North pole and the Equator. I will confess, I was ready to quit but the fear of being called a quitter urged me to stay with it. I found another smaller pair of gloves; wearing two pair I started to mold in earnest and became entranced with the work seeing how much I could mold in an hour.

"The next day we started working twenty-four hours a day with three shifts and I was quite contented to stay on my side of the table, but I did have an inward satisfaction of knowing that if a molder ever slowed up in production or ran into any difficulties with those two dies, that I could actually show him how to operate."

Mrs. Beaman has found that the mental design of a die given to a machine shop is not anywhere nearly as satisfactory as one drawn to scale on paper, so she has taken a course of engineering drawing at the Oregon Institute of Technology. Now she cannot only successfully read the drawings and specifications of a molding die, but can correct or draw one herself when the occasion requires.

She views the plastics industry with clear, cool judgment, has no false conceptions of over expansion and has

## CLASSIFIED

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➡ **FOR SALE: 1—Colton No. 5, Preform Machine 2½″; 1—Stokes "DD" Rotary Preform Machine, never used; 1—Colton No. 3, Rotary Preform Machine; 4 other Preform Machines single punch up to 2″; 4—Adamson Hydraulic Presses 24″ x 28″, 20″ rams; other Hydraulic Presses all sizes. WANTED: Accumulators, Hydraulic Presses, Ball Mills, Mixers, Sifters, etc. Send for complete list. Reply Box 218, Modern Plastics.**

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proved to her satisfaction and to her customers that a plastic molding plant can be run as well by a woman as by a man, when she knows how the plant is operated.

"Oh, yes," she says, "I have let many opportunities to make a million dollars slip through my fingers by refusing to invest money in dies and financing some inventor's dream invention. I have a very small plant, but perhaps someday I will be able to prove that old adage, 'Tall oaks from little acorns grow.' "

## MOLDS FOR PHENOL RESINOIDS

(*Continued from page 50*) The enforced use of preforms for all Naval production is one answer to this problem and merits the most careful consideration.

There are over 50 truly positive type molds used for producing Navy design pieces, this quantity being greater than for any other type of mold. Of this number, all are hand type except two which shows conclusively that the semi-automatic type truly positive mold has little application for Navy work. Outside of the two semi-automatic molds, the slightly more than 50 molds in question are divided almost equally into single cavity and multi-cavity types. It is interesting to note, however, that the 25 single cavity molds are all late designs, indicating the trend toward single cavity construction for the truly positive type.

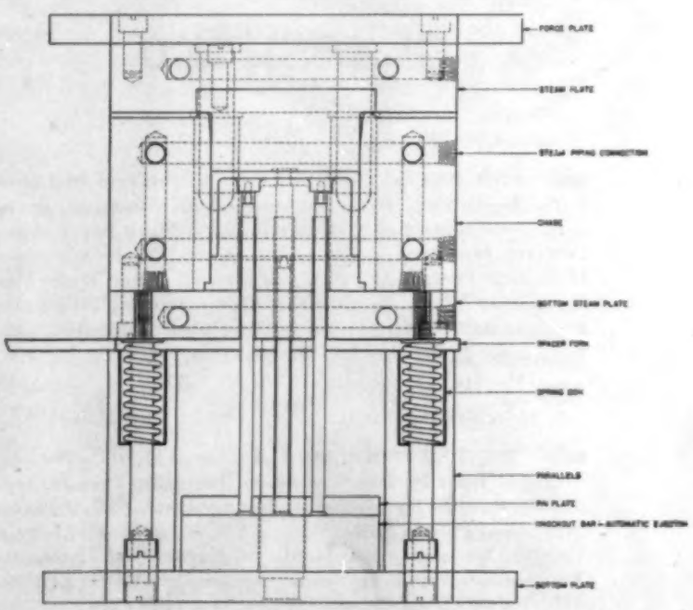
Of the group of 25 truly positive hand-type molds, 18 are for boxes and their covers, representing the best possible applications for this type of mold. Fig. 6 shows a typical box design produced by one of these truly positive molds. The molds for all except three of the boxes and for all covers are of the "Complete Closure" classification. This group of molds are for what may be termed "smaller" boxes and covers whose largest dimension does not exceed 6 inches. The weights of these molds run from 55 pounds to 200 pounds according to the size of the molded box.

The three molds mentioned as exceptions are for larger boxes and are of the spacer fork and spring box classification to facilitate the positioning of inserts which would otherwise involve difficulties if the complete closure type of mold were used. The weight of each of these three spring box molds is in the neighborhood of 300 pounds, and here again we find an exception to the "hand mold weight" limitation, previously set at 100 pounds. No other type of mold would be suitable for these designs.

Referring again to Fig 5, showing a truly positive mold for a box such as Fig. 6, it will be noted that the box is in a position with the bottom down. It will be seen that if the box were molded in a position with the bottom up, the holding pins for the inserts located in the bottom of the box would be much shorter; a very desirable feature. If the box were in this reversed position the deep side wall of the box would be formed in the chase instead of being formed in the force plug, and the depth of the chase would be increased to provide the necessary loading area. For some box designs and using some high impact materials the molding of boxes, bottom up, has proven very satisfactory and such procedure is highly recommended by some molders. On the other hand, much opposition has developed over this method and as all molders *can* mold boxes, bottom down, the bottom down position has been adopted for molding boxes in truly positive molds, as shown in Fig. 5. This point is mentioned in view of the highly controversial nature of the problem.

The nine cover molds of this group show more uniformity than the box molds, all being of the complete closure classification. Their weights run from 40 to 165 pounds, generally in accordance with the size of the molded piece. The remaining quantity of truly positive molds of this group are for producing insulating bases and follow closely the arrangement of the cover molds.

The group of approximately 25 multi-cavity truly positive molds previously mentioned as coming under the category of older designs, includes a number of mold types, for producing quite a varied number of molded designs. In this group we have switch handles, switch spacers, lamp sockets, insulating bases, push-bottom bodies, spools and even one case of box and cover. Some of these applications, notably switch spacers and lamp sockets, are correct in their multi-cavity classification even if of truly positive type. A number of these molds, however, if replaced would not retain the multi-cavity classification. Where the use of multi-cavity molds is desirable, four-cavity seems to fulfill the present ideas as to the extent cavities are to be "multiplied" for Navy work, whereas, a few years ago molds of 12-cavity and even 24-cavity were advocated.




BUILT UP CONSTRUCTION, DIRECT HEATED, SEMI-AUTOMATIC, SINGLE CAVITY, TRULY POSITIVE, SPRING BOX AND SPACER FORK, AUTOMATIC EJECTING MOLD

FIG. VII

The arrangement of a truly positive mold, semi-automatic, single cavity, direct heated, spacer fork and spring box, automatic ejecting is shown in Figure 7.—(*To be continued in March.*)